8th ANNUAL PRESS DIES & STAMPINGS ISSUE

JUNE, 1954

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

1954 · 1954 20th ANNIVERSARY YEAR

Pressworking the Aluminum Alloys

•

Lifters for Automatic Dies

•

Eliminating Safety Hazards in Press Operations

•

Low Cost Precision Jig Grinding

•

Selecting the Right Drawing Compound

•

In-Line Press Brake Production

•

Cutting Factory Costs with Permanent Magnets

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BPA

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THIS Verson TOOL-UP PRODUCES OVER 1000 VALVE COVERS PER HOUR *AUTOMATICALLY*

Consisting of a Verson Transmat Press and Verson Dies, this tool-up is an outstanding example of automatic stamping possibilities where production requirements are high. The press is a 600 ton, 6 station Transmat in which stock is fed from a coil. Five operations on valve covers for overhead valve engines are performed automatically without intermediate handling.

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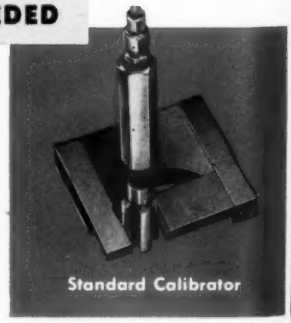

Standard Calibrator

To assemble and use these spindles, you need only an air gage and the equipment illustrated in the Kit plus a set of standard gage blocks—nothing else—not even one master setting ring. The air gage is calibrated by using the standard calibrator illustrated.

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6749

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

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Time and Tool Costs are Cut by using Putnam End Mills. For, they are properly designed and carefully manufactured for free cutting action, longer life and ability to "stand-up" when operated at high speeds and heavy feeds.

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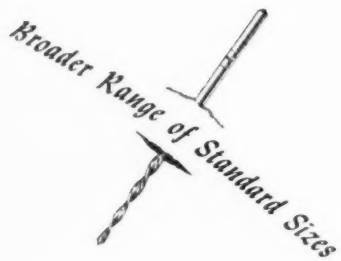

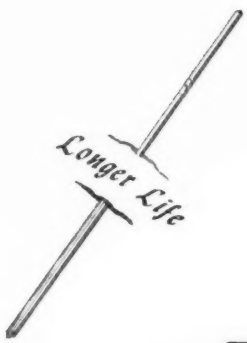

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TOOLING and PRODUCTION

The Magazine of Manufacturing Management

formerly

Tool-Die-Machine PROGRESS 1934-1941

TOOL & DIE JOURNAL 1941-51

VOL. XX—No. 3 JUNE, 1954

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Published Monthly by HUEBNER PUBLICATIONS, Inc.

Editorial and Business Offices:
1975 Lee Rd., Cleveland 18, Ohio
FAirmount 1-4040

Ship plates ONLY to this Office.
Publishing Office:
112 East Chestnut Street
Louisville 2, Kentucky

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The Know-How-Library of Tooling and Production

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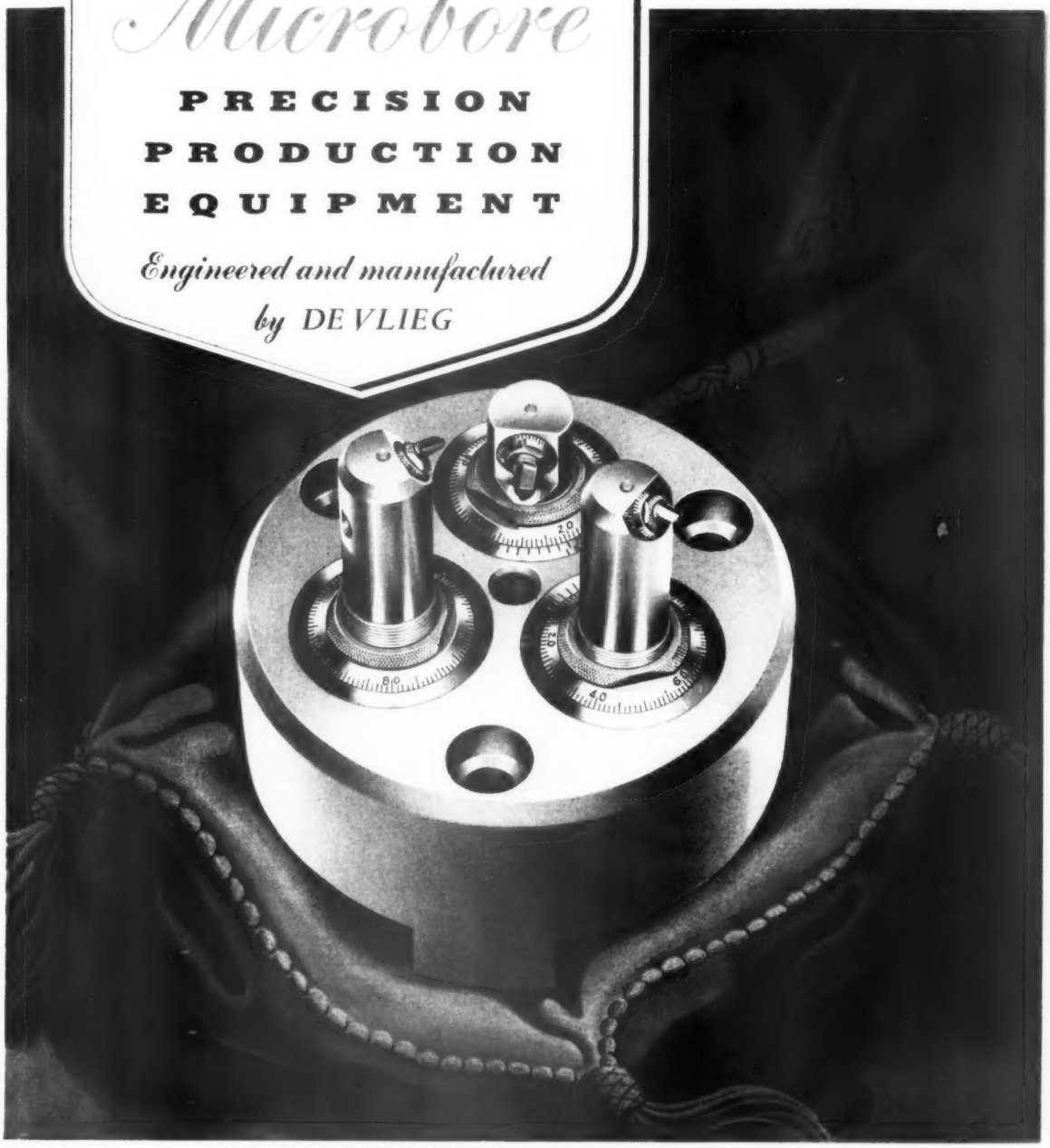

Courtesy of the Emerson Electric Mfg. Co., St. Louis, Mo.

Illustration shows Microbore cluster tool furnished to Emerson Electric Co., for finish turning O.D.—finish boring I.D. and facing operations at one pass. Standard Microbore units are arranged to provide micrometer vernier adjustment for both radial and linear settings of the cutting tools.

Send for new illustrated catalog.

Discuss your tooling problems with our Microbore specialists

DEVLIEG **MICROBORE COMPANY** 480 Fair Avenue, Ferndale • Detroit 20, Michigan

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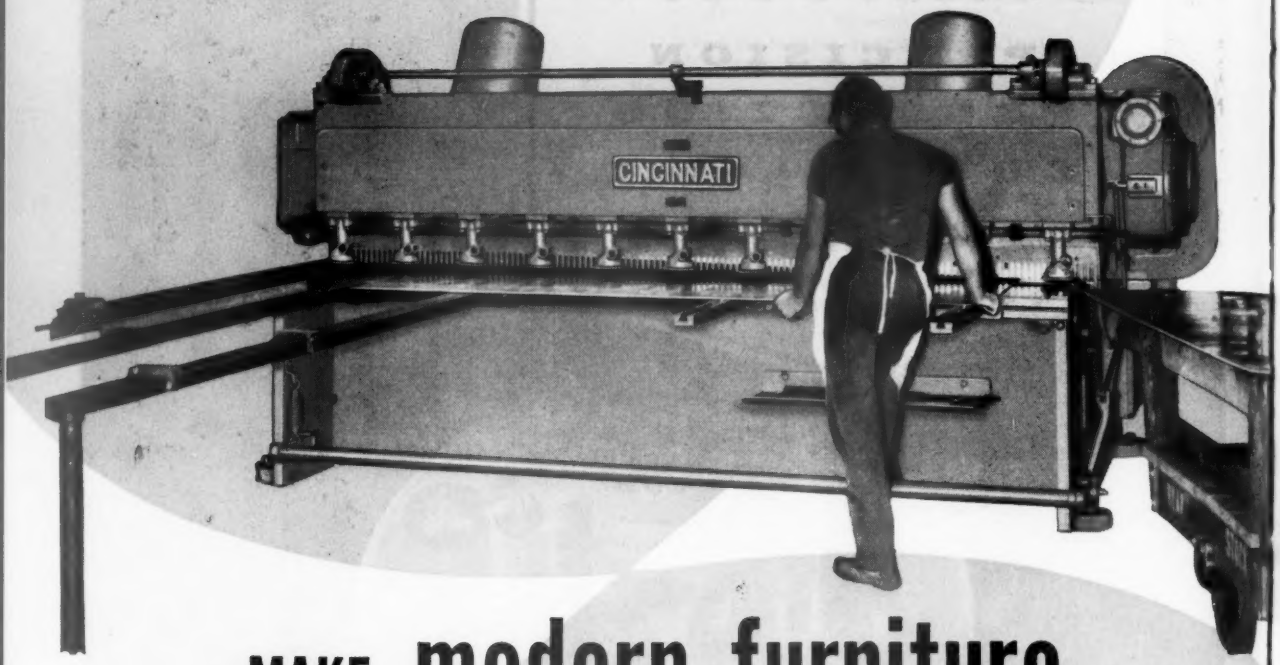
modern machines...



MAKE modern furniture...

Photos courtesy The Troy Sunshade Company, Troy, Ohio

In this modern furniture factory, modern Cincinnati Shears give an accurate, economical and versatile performance. Ease of operation, rapid, simple gauging, holding work securely and clean cutting, all speed production and reduce costs.

Write for
Cincinnati Shear Catalog S-6.

CINCINNATI

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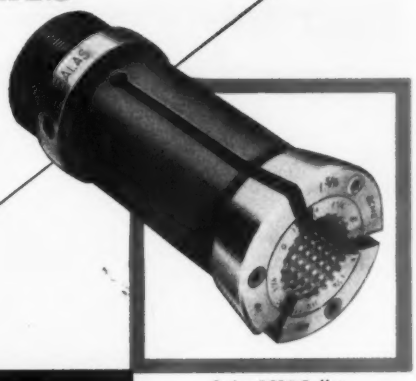
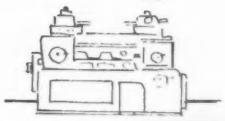
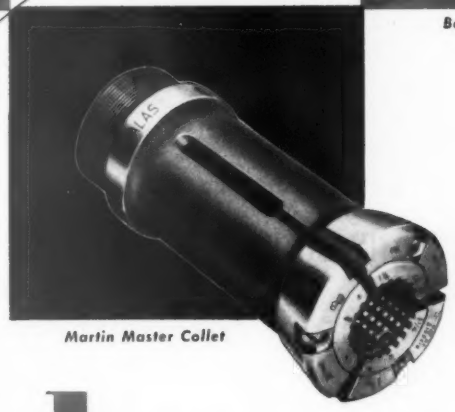
Balas "CT" Collet



Balas "CB" Collet





Martin Master Collet

Balas MASTER COLLETS

Save time on set-ups
Save money on tooling

THE BALAS LINE INCLUDES

- Master Collets and Pads
- Pushers and Feed Fingers
- Master Pushers and Pads
- Ejector Collets
- Collet Sleeves and Chuck Nuts for B.&S. Machines
- Carbide faced Stock Stops for B.&S. Machines

You reduce set-up time when you use Balas Master Collets because they are front loading... the pads are easily and quickly changed without disturbing the setting of the collet. "Cam grinding" on the taper provides faster opening and closing... tighter gripping and consistently accurate production.

You can save money and take advantage of the full capacity of your machines by using the proper Balas Master Collets and matched sets of pads to accommodate various sizes of stock. The specially selected alloy steel used in Balas Collets... their precision manufacturing, careful heat treating and rigid inspection makes them produce better... last longer.

Balas Master Collets are stocked for all popular automatics, for immediate delivery. Order them today to get better production at lower cost from your machines. Once you use them, you'll never again be without them.

BALAS COLLET MANUFACTURING CO.
CLEVELAND 14, OHIO

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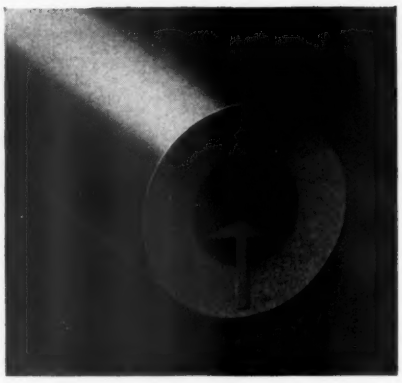
a hole here is annoying . . .



a hole here is helpful

Crucible Hollow Tool Steel Bars are helping eliminate the wasteful practice of drilling out a solid bar to make ring-shaped, or tubular steel parts, or tools with a center hole. The hole is already in Crucible hollow tool steel bars . . . no need for drilling, boring, cutting-off or rough-facing operations.

You can get these hollow bars in any of Crucible's famous tool steel grades, in almost any combination of O.D. and I.D. sizes. And you can get *immediate* delivery of five popular grades—KETOS® oil-hardening, SANDERSON® water-hardening, AIRDI 150® high carbon-high chromium, AIRKOOL® air-hardening, and NU DIE V® work tool steels—from a conveniently located Crucible branch warehouse.

Call your Crucible representative for the full story of how these steels can best save you time and money. You'll be glad you did.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

HOLLOW TOOL STEEL

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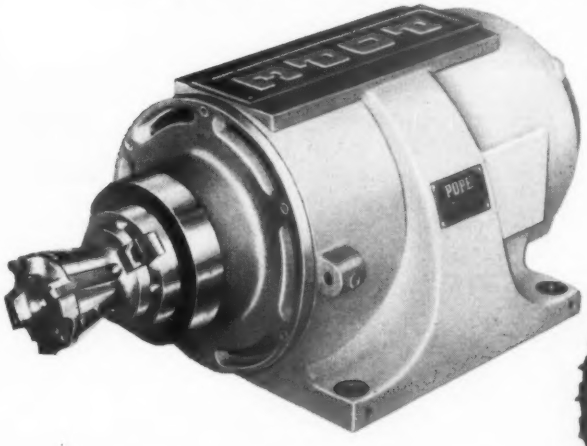
CIRCLE INFORM-A-GRAM KEY NO. 8

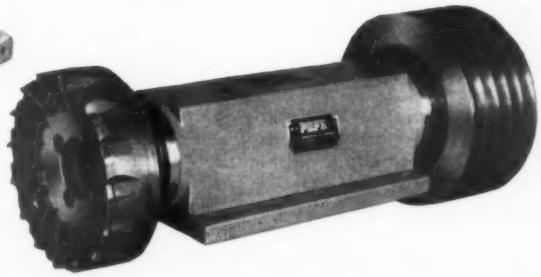
You Can *Specify* POPE HEAVY DUTY WHEEL HEAD SPINDLES With Confidence

POPE Spindles like these are designed for a wide variety of applications including grinding, boring, milling, drilling and many other operations requiring PRECISION COMBINED WITH RUGGEDNESS.

For continuous production and trouble-free operation
THERE'S NOTHING LIKE A POPE SPINDLE WITH ROLLER BEARINGS



◄ **P-2565 Heavy Duty, Totally Enclosed, Fan Cooled, Motorized Milling Spindle in sizes from 1 to 30 HP, 600 to 3600 RPM, 220-440 or 550 volts, 3 phase, 60 cycle (other electrical specifications available.)**



P-12007 Heavy Duty Belt Driven Milling ► Spindle, in sizes from 1 to 50 HP.

SEND US YOUR SPECIFICATIONS AND LET OUR ENGINEERS RECOMMEND THE SPINDLE FOR THE JOB YOU ARE GOING TO DO **No. 99**

Specify **POPE** PRECISION SPINDLES

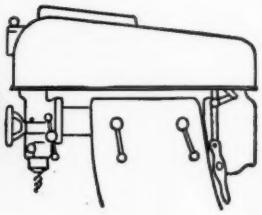
POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 9

NEWEST OF THE U. S.-BURKE SUPER-VALUE MACHINE TOOLS

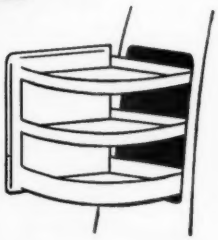
THE ECONOMICAL ANSWER TO ACCURATE, VERSATILE VERTICAL and ANGULAR MILLING

"U. S." VERTICAL Milling Machine



Balancing of head and motor and very substantial column provide increased rigidity and accuracy.

Another feature is the built-in spot light which assures maximum visibility at most vital points.



Swing-out shelves handily house tools right in the column of the machine.

Thoroughly tested on the job by many of America's foremost manufacturers.

Created by America's foremost producers of small milling machines, to fill the big need for a balanced-head vertical miller that provides greater capacity and flexibility than is normally associated with machines of its type.

The new U. S. Vertical ideally combines most advanced engineering, experience of practical machinists and modern design without sacrifice of basic characteristic "U. S." simplicity.

COSTS SURPRISINGLY LITTLE

Quickly pays for itself by simplifying or taking over vertical milling and boring jobs which often tie up far more costly standard machines.

SEND FOR COMPLETE DETAILS

Illustrated literature which describes complete specifications, capacities, exclusive features and advantages gladly furnished on request.

U. S. BURKE
MACHINE TOOL DIV.

Brotherton Road 7,
Cincinnati 27, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 10

How do you buy Socket Screws?

Do you specify some one make by *habit*, because you think *all* such fasteners are alike — all simply "screws with hex sockets?" If you do, and have never used P-K Socket Screws, break the habit *once* and give them a trial. You'll find that the hex shaped socket is about the *only* way other makes and P-K are "alike."

Look Beyond the Hex

It pays to look beyond the socket when you buy Socket Screws. Compare every detail of product and service, and you'll find P-K Socket Screws take top honors in every test for quality, performance, economy.

Why miss out on any of the advantages you can get with P-K Socket Screws? Try them. For samples, catalog, or any needed information, see your P-K Distributor, or write: Parker-Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.

The Only SIZE-MARKED Socket Cap Screws — with Gear Grip. Prevents errors . . . saves time and wasted screws when sizes get mixed up. Helps maintenance and service men in re-assembly. *Maximum Strength* — head, socket, threads accurately formed by P-K's cold-pressure process. Steel structure "flows" to conform to all contours, assures maximum strength at points of greatest stress.

FOR ADVANCED DESIGN that speeds assemblies — makes them simpler, stronger — and saves errors.

FOR TOP QUALITY and tolerance gaged to your most exacting specifications — and guaranteed.

FOR ASSEMBLY STRENGTH okayed in a million punishing tests by thousands of satisfied users.

FOR PLANNING AIDS and buying data patterned to your special needs, plus advice on assembly.

FOR SUPPLY SERVICE set up for fast action and lower purchasing expense — by local Distributors.

GET **ALL** THESE ESSENTIALS OF COST-WISE ASSEMBLY

PARKER-KALON SOCKET SCREWS

SAY **P-K**

FULL RANGE of styles and sizes. You'll find any Socket Screw you need in P-K's complete line. Hex Keys in all sizes, and several handy sets.

In Stock for immediate delivery — see your nearby P-K Distributor

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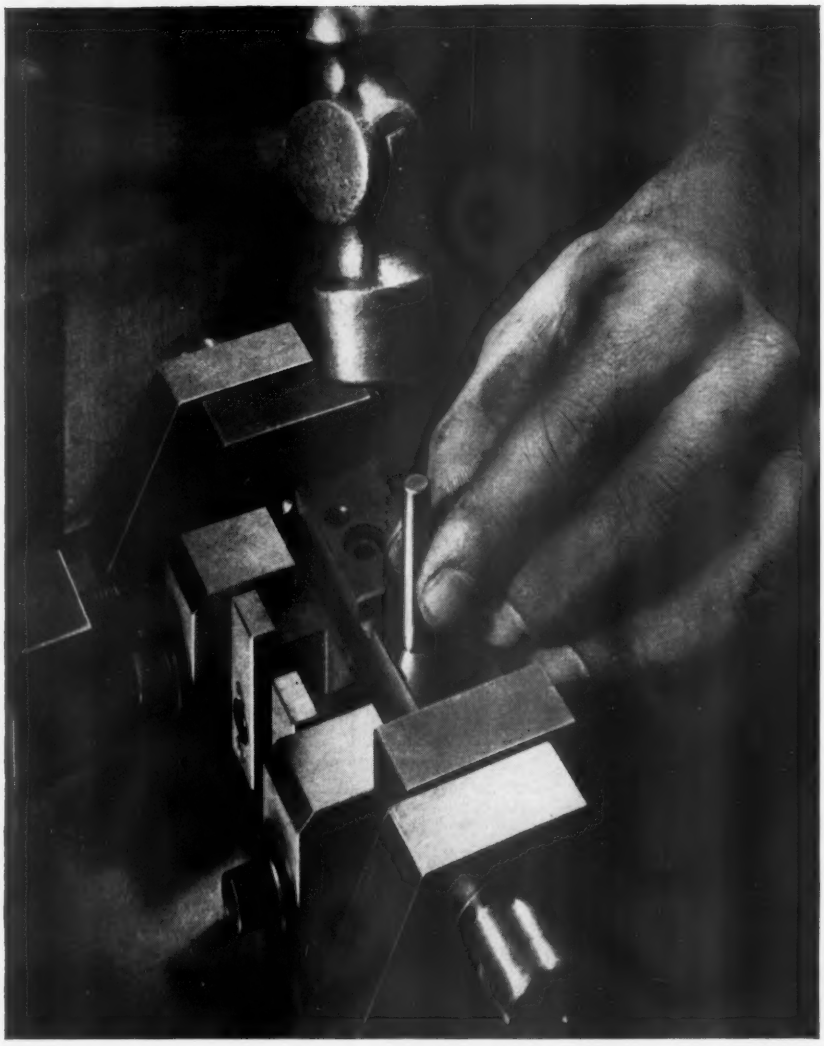
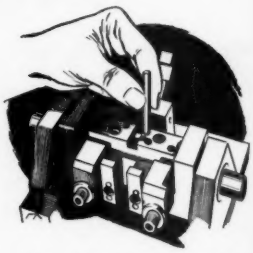
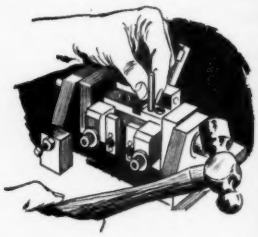


UNBRAKO Precision-Ground Dowel Pins are widely used for aligning parts, as in dies, jigs and fixtures. This radius grinding fixture, for putting a flat on electronic shafting, is a good example of such an application.



Assembler inserts formed end of UNBRAKO dowel pin into hole preparatory to tapping it into position.



Formed ends, with continuous grain flow, won't chip. Uniform heat treatment permits UNBRAKO dowel pins to be driven in and out of holes without upsetting.

UNBRAKO dowel pins—made of heat treated alloy steel—have a surface hardness of 60-62 Rockwell "C" Scale; a surface finish of 6 microinch maximum; a core hardness of 50-54 Rockwell "C" Scale; an average single shear strength of 150,000 psi; and a diameter tolerance of ±0.0001". They are available in two standard sizes in diameters from ⅛" to 1".

Keep your inventory at a minimum
Use UNBRAKO Standards—stocked by your distributor

Because your UNBRAKO distributor stocks a full line of standard UNBRAKO socket screw products, your inventory is lowered. This ready supply not only cuts your investment, but gives you faster delivery and reduces your buying costs. For a complete listing of standard UNBRAKO products, see your distributor or write STANDARD PRESSED STEEL Co., Jenkintown 36, Penna.

UNBRAKO® SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA

CIRCLE INFORM-A-GRAM KEY NO. 12

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...will be ...to holders of record of March 1.

...cent cash ...ymen made on Sept. 4, 1953.

or $4.30 a share, ... $10,511,423, or $6.95 a share, in

Angell Completes Major Pressroom Modernization with 16 New Presses... All Bliss-Built!

DAYTON, Ohio—New stamping capacity will put Angell Manufacturing Company in the "best competitive position in its history", R. H. Walker, company president, said today. He explained that the addition of 16 new Bliss presses has increased the company's capacity by 50%. Angell manufactures embossed, etched and lithographed nameplates, dials and escutcheons.

Angell decided to place all their press business with Bliss after years of experience with several makes of stamping presses. According to Mr. Walker, the Bliss presses were selected for their dependable operation, ease of set-up and maintenance, and reliable clutch performance.

...e Falls 1.70 Points

THERE MUST BE A REASON why Bliss presses are the unanimous choice of so many large contract shops. Dependable equipment? That's for sure: industry knows when it buys Bliss it buys designs that have stood the test of years.

To learn how Bliss presses can fit into your modernization plans, call for a Bliss engineer today.

175-ton straight side press (left) and battery of inclinable presses (above) are typical of new Bliss equipment used in the manufacture of nameplates, escutcheons and television panels.

BLISS SINCE 1857

on your press is more than a name... it's a *guarantee*

E. W. BLISS COMPANY, Canton, Ohio

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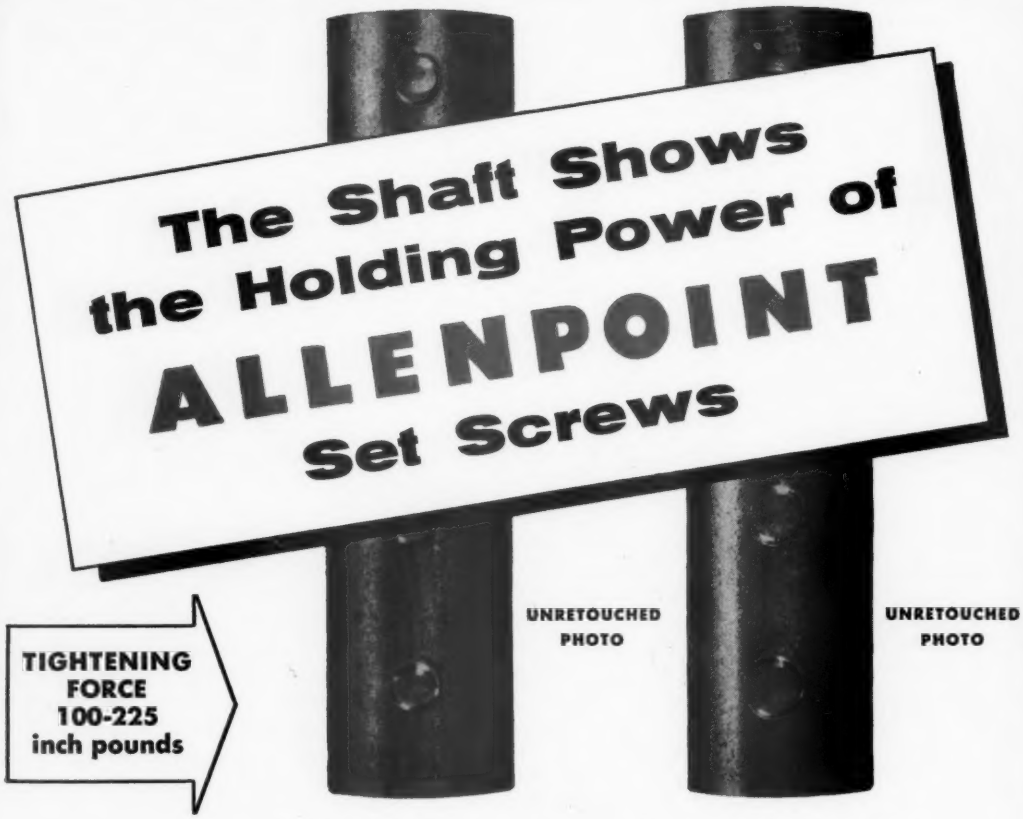
The Shaft Shows the Holding Power of ALLENPOINT Set Screws



ALLENPOINT—Smooth, even bearing surface. Deep point penetration for maximum holding power.

SERRATED POINT—Shaft penetration is slight and irregular. Bearing surface is spotty and rough.

Loosen a Set Screw and Look at the Shaft It's Pressing Against.

Has The Set Screw Made A Full Circle Impression?

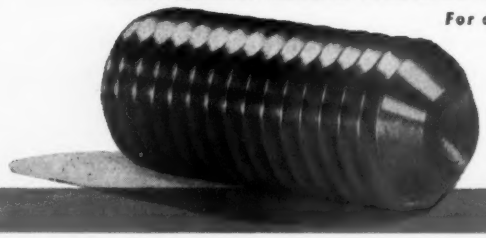
To obtain the maximum resistance to rotation and sliding movement, a set screw must bear evenly on the shaft. Allenpoint Set Screws reproduce a full circle pattern against their mating surface for increased holding power. Even on shafts of small diameter you get a full circle impression with the smaller cup point of Allenpoint Set Screws.

Has The Point Left An Uneven Ridge Around The Indentation?

The holding power of a set screw will be greatly reduced if the bearing surface is rough and irregular. Serrated point set screws cut into the shaft, raising a chip, removing stock and weakening their grip. Allenpoint Set Screws press firmly into the shaft and form a smooth, deep indentation. The result is holding power that tops any other type point.

WHEN ORDERING THROUGH YOUR LOCAL INDUSTRIAL DISTRIBUTOR, SPECIFY ALLENPOINT SET SCREWS

For additional information contact your Allen Distributor or write to —



ALLEN HEAD

ALLEN

MANUFACTURING COMPANY

Hartford 2, Connecticut, U.S.A.

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Latrobe's *Free Machining* High Production Die Steel

reduces machining time as much as

50%

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STEEL COMPANY
LATROBE, PENNSYLVANIA

Branch Offices and Warehouses BOSTON BUFFALO CHICAGO CLEVELAND DAYTON DETROIT HARTFORD LOS ANGELES MILWAUKEE NEWARK PHILADELPHIA PITTSBURGH ST. LOUIS ST. PAUL TOLEDO

Sales Agents ATLANTA CHARLOTTE DALLAS DENVER HOUSTON SALT LAKE CITY WICHITA

European Offices GENEVA BRUSSELS PARIS MILAN ROTTERDAM DUSSELDORF

READ WHAT BLOOMER OF CHICAGO SAYS

ABOUT WALES HOLE PUNCHING UNITS

MONEY AND TIME SAVING FEATURES . . .

Call on Wales-Strippit engineers before putting holes in angles, channels, sheets by any other method.

"NOT ONLY PAID FOR THESE WALES UNITS AND THE PRESS BRAKE BUT ALSO MADE OUR NORMAL PROFIT ON THE JOB"

"SETUPS WITH WALES UNITS ARE 8 TIMES FASTER THAN OUR FORMER GANG PUNCHING METHODS"

"ABLE TO DOUBLE THE RATED PRESS CAPACITY BY STAGGERING SHUT HEIGHT OF WALES UNITS WITH CAPS ON TOP OF PUNCHES"

"ELIMINATE STRIPPING PROBLEMS, SPOILED WORK FROM IMPROPER STRIPPING, AND BROKEN PUNCHES"

BLOOMER HEATING & VENTILATING CO.

Contractors - Fabricators

1237 WEST 47TH STREET · CHICAGO 9, ILL.
FIRMSTONE 6-2233

February 26, 1954

Wales-Strippit Corporation
408 Madison Avenue
Oak Park, Illinois

Attention: Mr. Homer C. Gray

Gentlemen:

Very seldom in the operation of a fabricating plant have I come across such cost and time saving opportunities as have been made possible by Wales Hole Punching Units.

To give you a little background, my company bid a job, based on our former gang punching method of tooling, and after we received the order as low bidder, I investigated and bought Wales Units. In addition, we purchased another press brake. The cost records show that we not only paid for these Wales Units and the press brake with this one job but also made our normal profit on the job. We also bettered our delivery estimate by six weeks. Since the completion of this first order I have been using these same Wales Units on similar jobs.

My experiences have proven that setups with Wales Units are eight times faster than our former gang punching methods. Press down-time between setups is practically eliminated by mounting these Units on templates outside the press and just placing the entire assembly on the press bed, ready to start punching.

We were able to double the rated press capacity by staggering the shut height of Wales Units with caps on top of punches. Your Wales Units eliminate stripping problems, spoiled work from improper stripping and broken punches.

I thought you would be interested in these highlights of my experience with your tooling equipment and so I am enthusiastically passing along to you the results of my experience with Wales Hole Punching Units. I am also enclosing photographs of your equipment in operation.

Very truly yours,

BLOOMER HEATING & VENTILATING COMPANY

E. Ellis

E. Ellis
Plant Superintendent

EE:rp

This letter from Bloomer Heating & Ventilating Company points out typical time saving and money saving advantages that are also experienced by the thousands of users of Wales Hole Punching Units.

Patented, independent, self-contained Wales Units permit the same group of units to be used and reused in unlimited hole punching setups without aligning punches and dies in the press.

Write for the fully-illustrated, functionally colored catalogs that completely describe Wales Hole Punching Units.

WALES-STRIPPIT CORPORATION

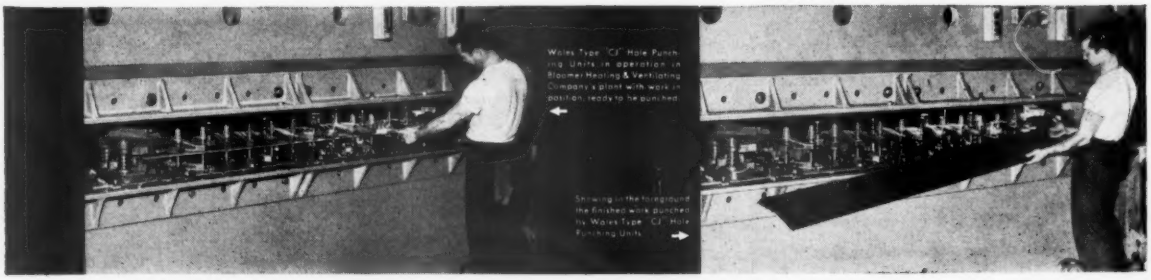
George F. Wales, Chairman

355 Payne Avenue, North Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

Wales-Strippit of Canada Ltd., Hamilton, Ontario

Specialists in Punching and Notching Equipment


Wales Type "CI" Hole Punching Units in operation in Bloomer Heating & Ventilating Company's plant with work in position ready to be punched.
Showing on the foreground the finished work punched by Wales Type "CI" Hole Punching Units.

CIRCLE INFORM-A-GRAM KEY NO. 16

"Standards" by WAUKESHA

. . . meet most of your Cutting Tool Needs . . . most of the time!

The use of Waukesha Standard Inserted Blade Reamers, Spade Drills and Counterbores eliminates substantial investments. Their adjustability, adaptability, and ready availability makes standard Waukesha Cutting Tools economical to use. Every Standard or Special Waukesha Spade Drill Holder is made so that cutting fluid can be brought to the cutting edge.

consult WAUKESHA

. . . for competent cutting tool counsel. Waukesha sales representatives and engineers are qualified to work with your own staff in adapting standard Waukesha Tools to your needs . . . or in the development of special cutting tools.

Ask Our Representative, or write for new Waukesha Catalog No. 25

Representatives in Principal Cities

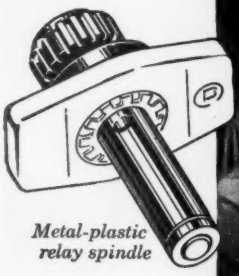
INSERTED BLADE SPADE DRILLS

Lower in cost than solid twist drills. Holder lasts indefinitely. Only blades need be replaced — assuring low maintenance cost. 1-1/32" to 5" diameter stocked for immediate delivery.

WAUKESHA TOOL CO. WAUKESHA WISCONSIN

Keller Compression Riveters

give a squeeze ...not a wallop



Metal-plastic relay spindle

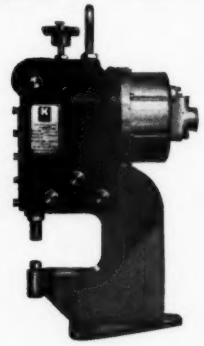
Reduce breakage when metal-plastic assemblies are forced into a pressure fit

Here is the experience of a Keller customer in manufacturing electric relay spindles, consisting of brass posts and pressure-fitted plastic collars.

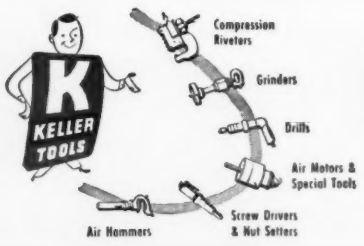
Attempts to assemble by hand were slow, inaccurate, and costly. Staking the parts together with solenoid-operated power equipment had to be abandoned because the sudden, sharp impact shattered too many plastic collars and made breakage costs excessive.

The problem was solved when a tool engineer fitted Keller Compression Riveters with special lever arms. When the arms descend, the parts get an air pressure squeeze—not a wallop—and are pressed together firmly with little or no shock. Air power exerts maximum force at the end of the stroke, where it is most needed; and pressure is not released until the arm completes its full stroke.

Perhaps this characteristic of applied air power would save breakage and reduce costs in some of *your* plant operations. Have you discussed it with the Keller application engineer near you?



Keller yoke-type Compression Riveters may be used for pressing, crimping, or forming, as well as riveting.



KELLER

Pneumatic Tools

KELLER TOOL COMPANY, 1313 Fulton St., Grand Haven, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 18

DOES CARBIDE COST TOO MUCH?

WESSONMETAL Cemented Carbide

WESSON TOOLS

LOOK AT THIS COMPARISON BETWEEN WESSONMETAL AND HIGH SPEED STEEL

with WESSONMETAL

Your Higher ORIGINAL COST RESULTS in LESS COST per PIECE!

Actual Job

Caterpillar Tractor Co.

Part Name..Cutting Edge Bulldozer Scraper Blade
Operation Description...Form Edge Scraper Blade
Machine Model—Type..Rockford Planer Series #4
Tool Type.....MX-7 Multicut Planer Holder
Planing Speed.....100 S.F.M.
Feed.....025
Depth of Cut.....0 to 7/8" Max.

OLD H. S. STEEL METHOD	NEW WESSONMETAL METHOD
Pieces per Grind.....16 to 1	Pieces per Grind.....13½
Total Tool Cost.....$49.25	Total Tool Cost.....$97.16
Average Pieces per tool life.....24 Pieces	Average Pieces per tool life.....324 Pieces
Tool Cost per Piece.....$.60	Tool Cost per Piece.....$.07

HOW IS YOUR PRODUCTION SCORE CARD?

Call the Wesson Tool Engineer in your area for complete service. Ask to see Wesson's new movie "This Carbide Age."

WESSONMETAL Cemented Carbide

WESSON METAL CORPORATION
LEXINGTON 34, KENTUCKY

CIRCLE INFORM-A-GRAM KEY NO. 19

13 Key Moore Tools help put the PRECISION in Harig Dies

KARL HARIG

"When owner-management invests its money in machinery," says Karl Harig, founder and president of Harig Manufacturing Corporation, "it does so only after a thorough analysis and careful selection of available equipment." So it's significant that Harig, one of America's foremost producers of carbide, lamination, progressive, stamping and other types of precision dies, employs 13 Moore precision-built machine tools for many of its most critical toolroom operations.

A trip through Harig's modern Chicago plant reveals:

3 MOORE JIG BORERS, for accurate locating and boring of holes in a fraction of the time required by other means;

6 MOORE JIG GRINDERS, for relocating and grinding of holes and contours—within tenths—after hardening;

3 MOORE PANTO-CRUSH WHEEL DRESSERS, for speedy, cost-cutting performance of both crush-forming and diamond-dressing on the wheel spindle of a surface grinder;

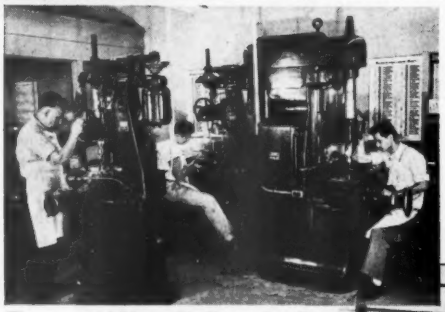
1 MOORE DIE FLIPPER, for "mechanized" die tryouts and assembly.

The combination of Harig craftsmanship and Moore precision tools has been an important factor in Harig's successful effort to meet continuing demands for faster production of intricate dies, tools, jigs, fixtures and gauges.

Why not discover how Moore tools can bring more speed and greater accuracy to *your* toolroom. Write today for our detailed literature.

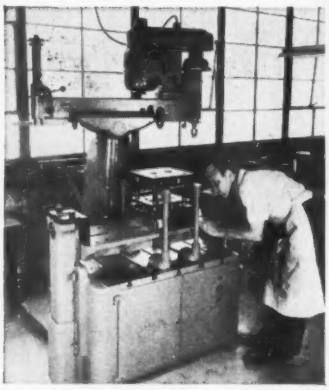
Moore Special Tool Company, Inc.
726 Union Avenue, Bridgeport 7, Connecticut

A battery of six Moore Jig Grinders performs precision internal and contour grinding operations on sectional die parts at the Harig plant.



Three rugged Moore Jig Borers handle the bulk of Harig's critical spotting, drilling, boring and reaming operations.

Harig uses this Moore Panto-Crush Wheel Dresser on a surface grinder for fast pantograph profile grinding. Harig also has two more of these cost-cutting units.



A Moore Die Flipper facilitates accurate die tryouts and assembly at Harig, replaces time-consuming hand-labor methods.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 20

American

FEATURES NEW Ordering Method

Plus KING SIZE Selection

Get American's NEW CATALOGS for YOUR KING SIZE SELECTION

American's 3-D simplifies ordering drill jig bushings — eliminates confusing code numbers. No need to search through many pages — American's catalog shows all of their KING SIZE selection of ASA and American Standard types of sizes on two facing pages. (50% of your specials are now American's standards.) All you have to do is order 1—I.D.; 2—O.D.; 3—LENGTH.

Order American Drill Bushings the 3-D way . . . from our fully stocked distributors located in every major area throughout the U.S. You can get the right drill jig bushing when you want it!

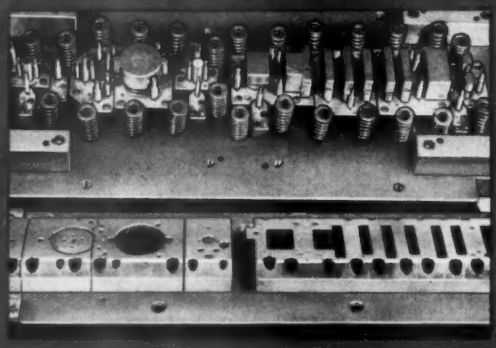
American
DRILL BUSHING CO.
5107 Pacific Blvd., Los Angeles 58, California

LOOK FOR A THE TRADEMARK

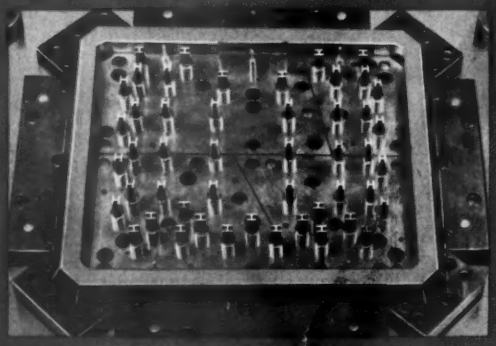
SPECIALIZING ONLY IN DRILL JIG BUSHINGS!

CIRCLE INFORM-A-GRAM KEY NO. 21

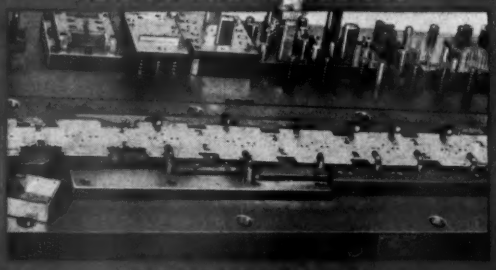
WHO USES R-B PUNCHES



PIERCE DIE



DRAW and PIERCE DIE



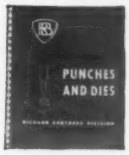
PROGRESSIVE DIE

Through many years of providing America's leading industries with interchangeable and standardized punches, die buttons and retainers, R-B has built a reputation for increasing production, lowering costs and saving time. R-B case histories of savings and benefits include users of cam actuated, multi-station progressive, forming, blanking, piercing, embossing and combination dies of all sizes and types.

Why don't you investigate the cost saving features of R-B equipment?

Use R-B Engineering Service for Your Tough Piercing Problems.

RICHARD BROTHERS PUNCH DIVISION
ALLIED PRODUCTS CORPORATION
DEPT. 77 • 12635 BURT RD. • DETROIT 23, MICHIGAN



Please send me additional information.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Also Produced in
OTHER ALLIED PLANTS
SPECIAL COLD FORGED PARTS
STANDARD CAP SCREWS
PRECISION GROUND PARTS
SHEET METAL DIES
MADE OF FERROUS ALLOYS, ZINC ALLOYS OR PLASTICS

CIRCLE INFORM-A-GRAM KEY NO. 22

Try SANDVIK *Coromant*

CARBIDE TOOLS DESIGNED FOR LONGER-LASTING TOOL "BITE"

Coromant's quality and high wear-resistance means lower maintenance cost—higher production per tool.

The reasons for SANDVIK COROMANT'S success are:

1 **EXTENSIVE RESEARCH COMBINED WITH ENGINEERING SKILL**
Sandvik's modern metallurgical laboratories have developed carbides extremely well suited in hardness, wear and cratering resistance and strength for every type of material.

2 **BASIC PURITY OF RAW MATERIAL**
The ore from Sandvik's tungsten mine is among the purest found anywhere in the world.

3 **UNIFIED CONTROL BY SANDVIK FROM ORE TO FINISHED PRODUCT**
From the tungsten mine through each production stage, Sandvik maintains close control and careful inspection.

4 **HIGH QUALITY, SHOCK AND VIBRATION RESISTANT STEEL SHANKS**

5 **UNIQUE BRAZING METHOD WITH HIGH MELTING POINT BRAZING**

6 **COMPETENT ENGINEERING SERVICE**
Thousands of work files are at your disposal along with well trained field engineers to help to solve your machining problems.

Coromant is available:

- **In a wide variety of tools and blanks from stock—including many shapes and designs which have been considered "specials" before.**
- **In all standard grades with improved performance to suit a wide range of applications.**
- **Grades permanently color-identified on the end of tool shank and etched in the carbide blanks.**
- **In the new, time saving "Coromant Combination Cutter."**

Why not try Coromant's long-lived "bite" on your application. Contact Sandvik for further information.

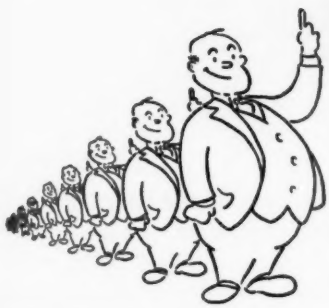
COROMANT DIVISION • SANDVIK STEEL, INC.
111 Eighth Avenue, New York 11, N. Y. • WAtkins 9-7180
Detroit: 20005 James Couzens Hwy, Detroit 35, Mich. • VE 7-9507
SANDVIK CANADIAN LTD. • P. O. Drawer 430, Station O, Montreal 9, P.Q. • BYwater 7501 • 25 Milford Avenue, Substation 83, Toronto, Ontario • CHerry 1-3477

From ore to finished product within the same company

ANOTHER SWEDISH TOP QUALITY PRODUCT
SANDVIK *Coromant*

SS-98

Tracer Controlled Machining Applied To Both Large and Small Lathes



MR. DUPLICATOR SAYS—"We note that there are many huge turning machines and we are appalled at the contrast between the large and small machine tools. Isn't it difficult for you to build both large and small Duplicators?"

WALKER SAYS—"Sometimes the contrast does make us blink our eyes, when we note the difference in engineering that is accomplished. We have many large Duplicators working on huge machines and our small Duplicators require just as much ingenuity to build. Our motto is: NO MACHINE IS TOO LARGE NOR TOO SMALL TO HAVE A DUPLICATOR ON IT. This we bring out to you in the photo above. One Duplicator shown is turning door knobs, and the other, parts of a highly secret nature. They are both built with the highest of precision. The large one is just as accurate as the small one. Cuts of .001" can be taken with the big one just as easily as with the small one. Only WALKER DUPLICATORS can give you such precise measurements. This is the result of approximately 25 years experience in building hydraulic Duplicators."

WALKER DUPLICATORS are recognized as the ultimate in duplicating perfection. This is testified to by the many machine tool manufacturers who recommend our Duplicators as standard equipment for machine tools. Such recommendations must be merited. Our design is simplicity personified: a hydraulic power unit, a hydraulic cylinder, and our tracer control valve. No mirrors, clutches, periscopes, nor electronic equipment. Our Duplicators are truly hydraulic.

WALKER DUPLICATORS on milling machines use such a light touch to operate our tracer control valve that soft models made of wood or plaster can be used. We can make the vertical mill do the same class of work as the Keller or Hydrotel. We also put our Duplicators on boring mills from the smallest to the largest; duplicating from small models made from soft wood or plaster. Planers, shapers, and grinders, also have our Duplicators applied to them, as well as special machines. Where true accuracy is needed our Duplicators will take care of you. They will not let you down.

MODERNIZE THE MACHINE TOOLS YOU ALREADY HAVE—Send us a print of the part to be made; size and make of the machine tool to be MODERNIZED; and we will send you a firm and understandable quotation.

MORE WALKER DUPLICATORS have been built under our patents than all the rest of the Duplicators put together. We are recognized as an authority on duplicating. We can help you! Write or call us today! Phone: 7871.

REPRESENTATIVES IN PRINCIPAL AREAS

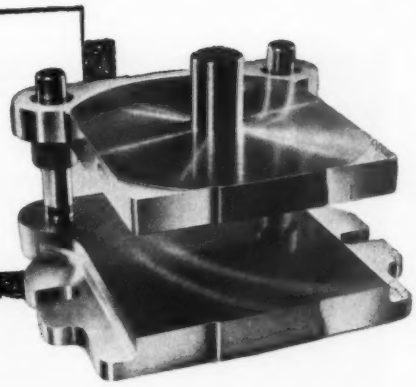
Walker HYDRAULIC DUPLICATOR CO.

P. O. Box 464 STANDISH, MICHIGAN

Pioneer Designers and Builders of Precision Duplicating Equipment

CIRCLE INFORM-A-GRAM KEY NO. 24

World's fastest die set service in action



Here's where faster die set service begins, on Danly's high speed precision production lines . . . the finest mass production facilities in the die set field.

Here's where your order is received . . . in one of Danly's Branch Plants. Because all die components are close at hand, your order is filled immediately.

Now—Danly unites mass production techniques with the precision touch of craftsmanship to bring you the fastest die set service . . . ever.

Never before has there been a die set service as fast as the one that Danly now offers to you. Unique in concept, the system had its beginning some years ago when Danly originated its network of nationwide Danly Branches. Under such a system the main Danly Plant in Chicago provided thousands of *interchangeable* die set parts to Danly Branch Plants. It meant that such parts were easily assembled into standard die sets and then quickly delivered to meet the requirements of any tooling program.

But, as buyers recognized the convenience of Danly service, demands on the Chicago Plant grew to exceed capacity. The solution? . . . an unprecedented move in the die set field. Danly put die set manufacture on a mass production basis with no sacrifice of famous Danly precision. It was accomplished with amazing new facilities in the form of two complete production lines devoted exclusively to high speed, precision die set production. The next time you put one or a dozen Danly Die Sets on order, expect to get fast delivery from any Danly Branch, expect to get die sets unequaled in precision. You can expect it and you'll get it . . . when it's Danly.

DANLY

DIE SETS . . . STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES

Fast, nationwide delivery from these plants

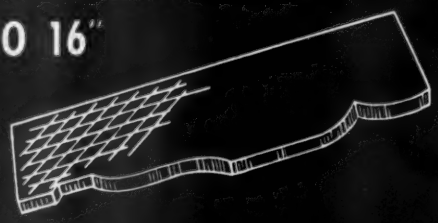
***CHICAGO** 50	2100 S. Laramie Avenue
***CLEVELAND** 14	1550 East 33rd Street
***DAYTON** 7	3196 Delphos Avenue
***DETROIT** 16	1549 Temple Avenue
***GRAND RAPIDS**	113 Michigan Street, N.W.
INDIANAPOLIS 4	5 West 10th Street
***LONG ISLAND CITY** 1	47-28 37th Street
***LOS ANGELES** 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
***PHILADELPHIA** 40	511 W. Courtland Street
***ROCHESTER** 6	33 Rutter Street

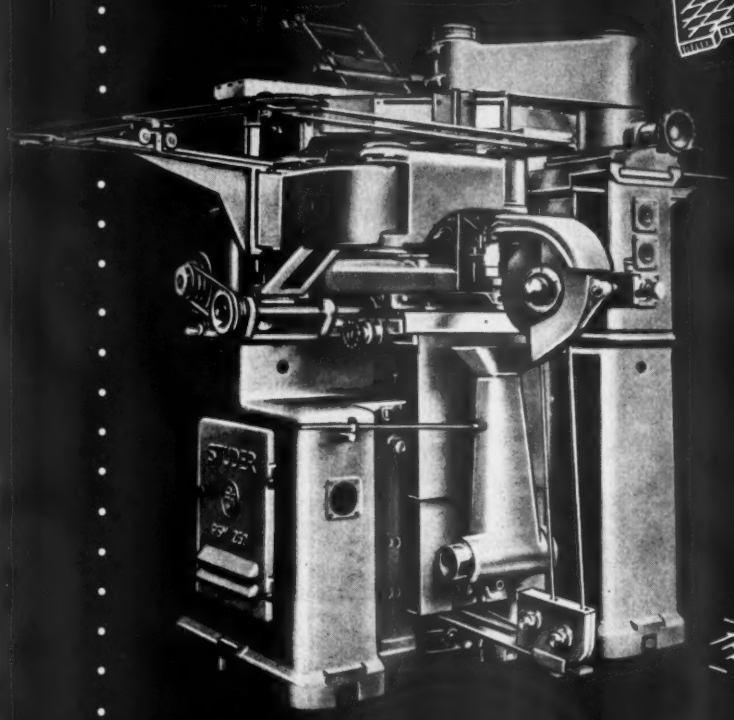
**Indicates complete stock.*

THE STUDER PSM-250

GRINDS PROFILES UP TO 16"

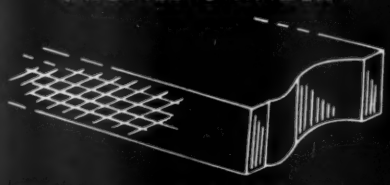
IN ONE SETTING





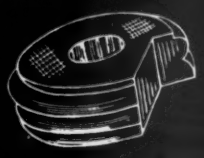
LARGER FLAT OR CIRCULAR FORM TOOLS, SECTIONAL DIES, GAUGES AND OTHER PROFILE PARTS CAN NOW BE ACCURATELY GROUND ON THIS

NEW STUDER PROFILE GRINDER



INCREASED CAPACITIES
The PSM-250 grinds profiles up to 16" long in one setting and accepts flat work pieces up to 4 3/8" thick and rounds up to 10" diameter. Templates up to 24" long are easily accommodated. The adjustable pantograph can be set in any ratio from 1:1 to 1:10.

CLEARANCE ANGLE AND RELIEF GRINDING
Attachments are available to grind different clearance angles on flat form tools—*without correcting template form;* and, to relief-grind punching and drawing dies.



AUTOMATIC TRACER GUIDE
This attachment automatically guides tracer bar along the template. The automatic, uniform feeding produces improved surface finishes and increases the life of grinding wheels. To guide tracer bar by hand, two screws are loosened to detach the device.

PRECISE GRINDING
Profiles can be ground to a tolerance of ± 0.0004". Closer limits are obtainable when large ratios of reductions are employed.

WRITE FOR CATALOG ILLUSTRATING AND DESCRIBING THE NEW STUDER PSM-250

COSA CORPORATION
405 Lexington Ave., New York 17

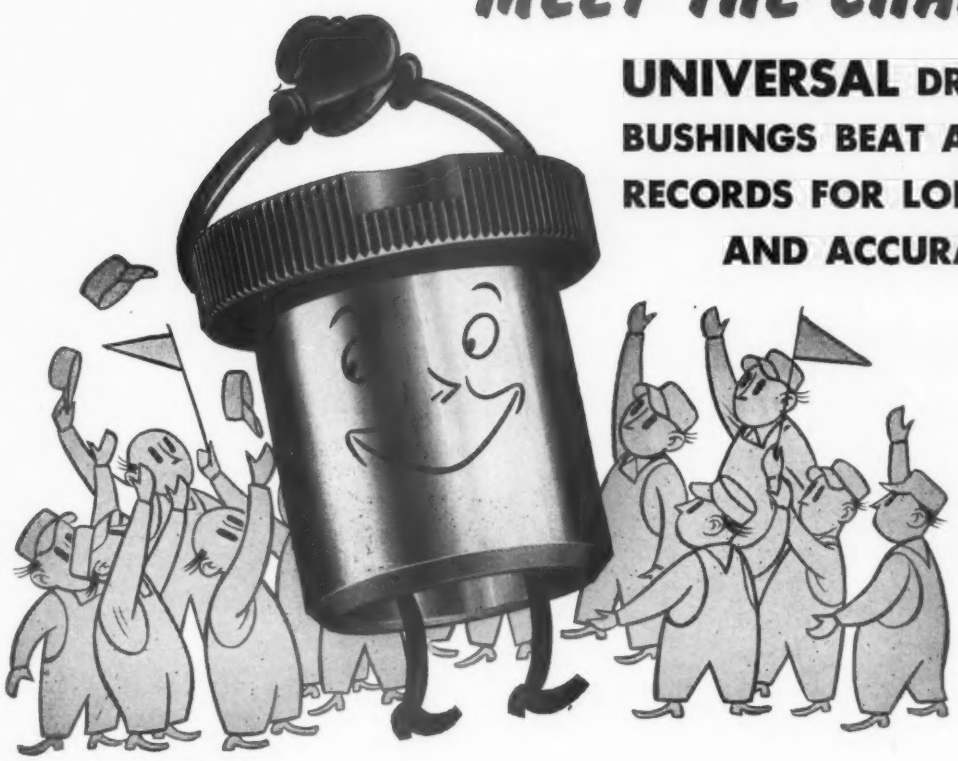
Your source for all Precision Machine Tools— from Small Bench Lathes to Large Boring Mills

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 26

MEET THE CHAMP!

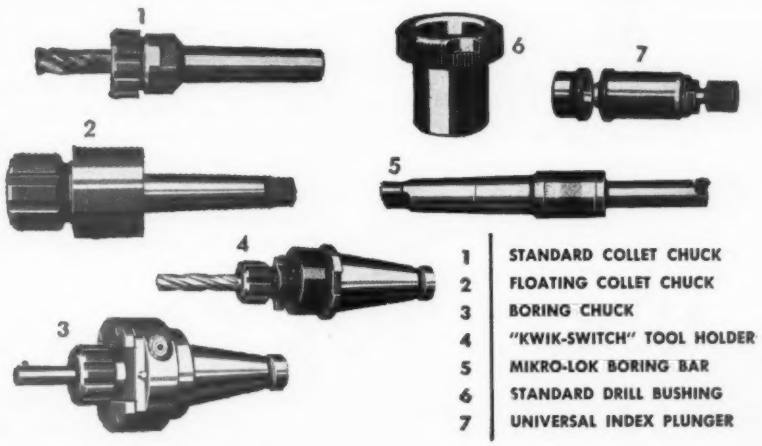
UNIVERSAL DRILL BUSHINGS BEAT ALL RECORDS FOR LONG LIFE AND ACCURACY



The extremely long life of Universal Drill Bushings is due to several factors. They are machined from finest quality steel. Their superhoned bores help to reduce both wear of the bushing and wear of the tools. Blended radius on the top inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests insure accuracy and uniform quality. Knurled heads provide a quick, sure grip. Available in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.

179

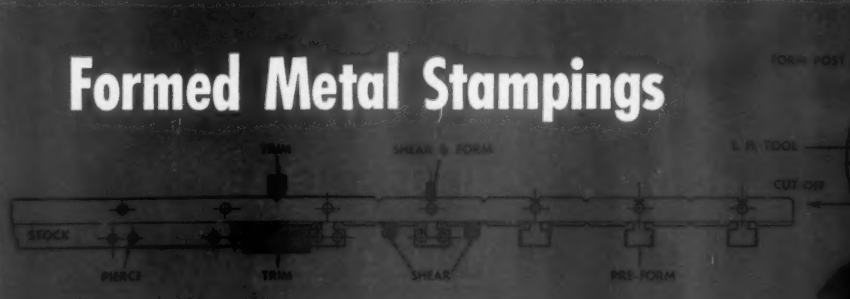
UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 8
MICHIGAN



1 STANDARD COLLET CHUCK
2 FLOATING COLLET CHUCK
3 BORING CHUCK
4 "KWIK-SWITCH" TOOL HOLDER
5 MIKRO-LOK BORING BAR
6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER

CIRCLE INFORM-A-GRAM KEY NO. 27

Formed Metal Stampings



Produced Complete in the U. S. MULTI-SLIDE®

ACTUAL SIZE OF METAL STAMPING

The electrical part shown actual size at the left is produced from coil stock—complete, without further handling—at a speed of 140 per minute in the No. 28 U. S. Multi-Slide®. Another example of the advantages of the U. S. Multi-Slide for the precision fabrication of many types of metal parts calling for piercing . . . blanking . . . forming . . . swaging . . . embossing and similar operations!

The part illustrated is made of phosphor bronze .025" thick, and the sequence of operations is as follows: pierce 3 holes; trim top and bottom; shear on bottom; preform; cut off; finish form. The last operation is shown in detail in the profile view within the circle above.

In addition to eliminating costly secondary operations, U. S. Multi-Slides save manpower, too. A single operator can attend a battery of Multi-Slides, since the operation is entirely automatic. Operator merely loads coils of material onto a stock reel for feeding into the machine.

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AMPERE (East Orange) NEW JERSEY

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U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories

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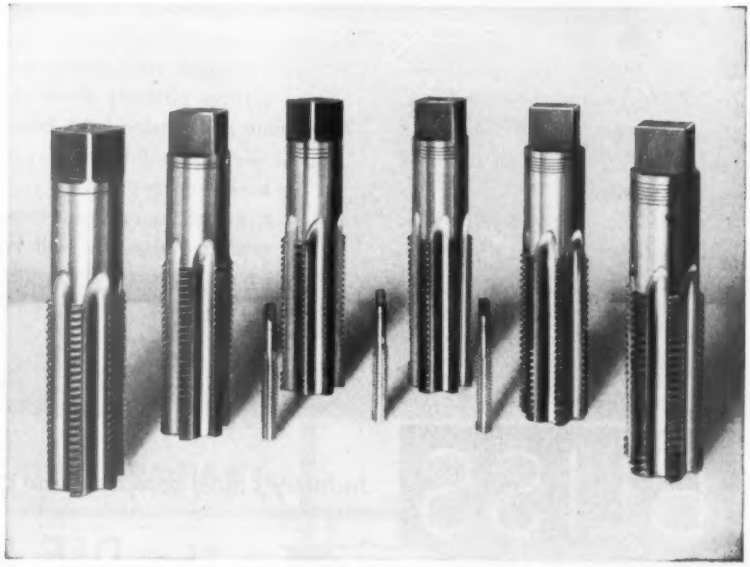

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CIRCLE INFORM-A-GRAM KEY NO. 31

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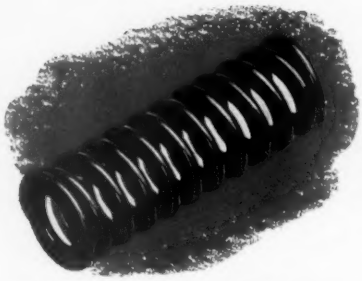
Their answers sparked DIECO's metallurgical and design research...led to a complete new line that

out-performs others up to 3 to 1



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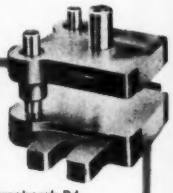

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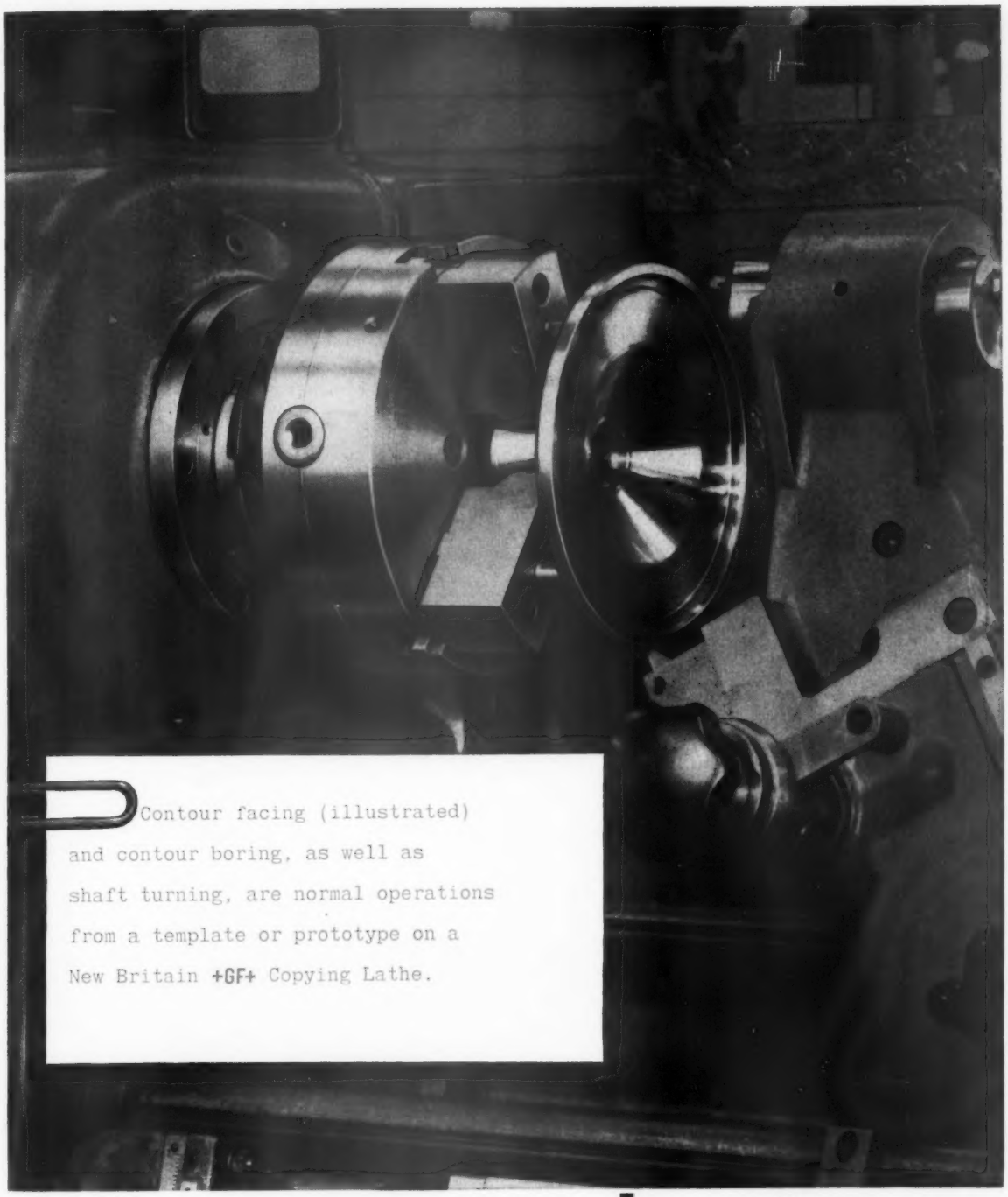

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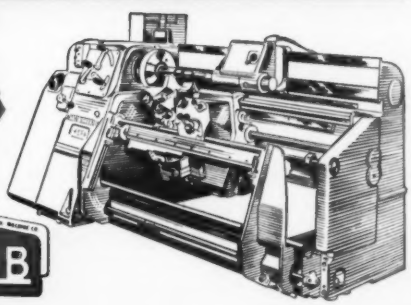

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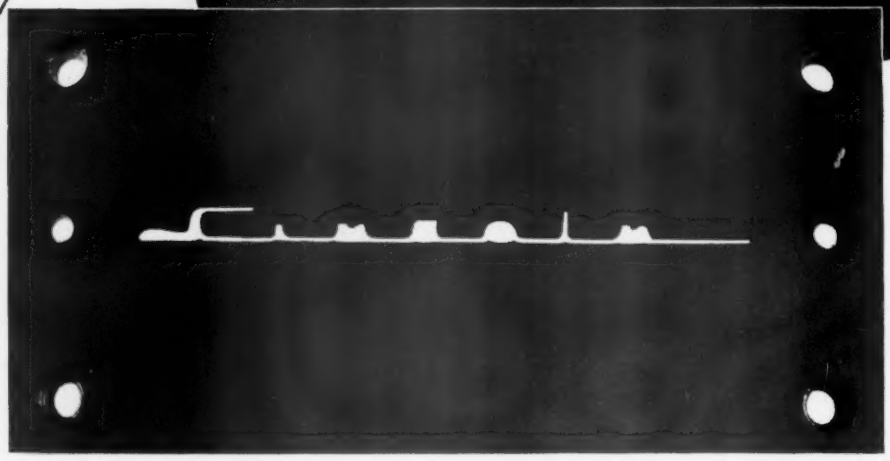
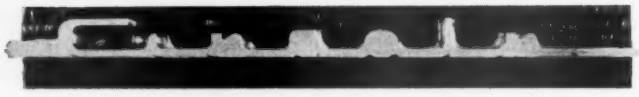


FINISH TRIM DIE



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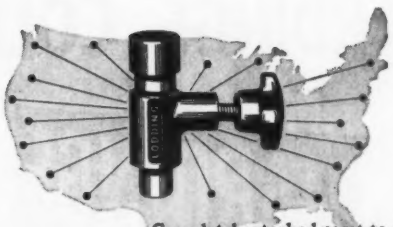

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SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

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MATERIALS HANDLING. "Gaining Maximum Press Production With Modern Materials Handling" ... 60
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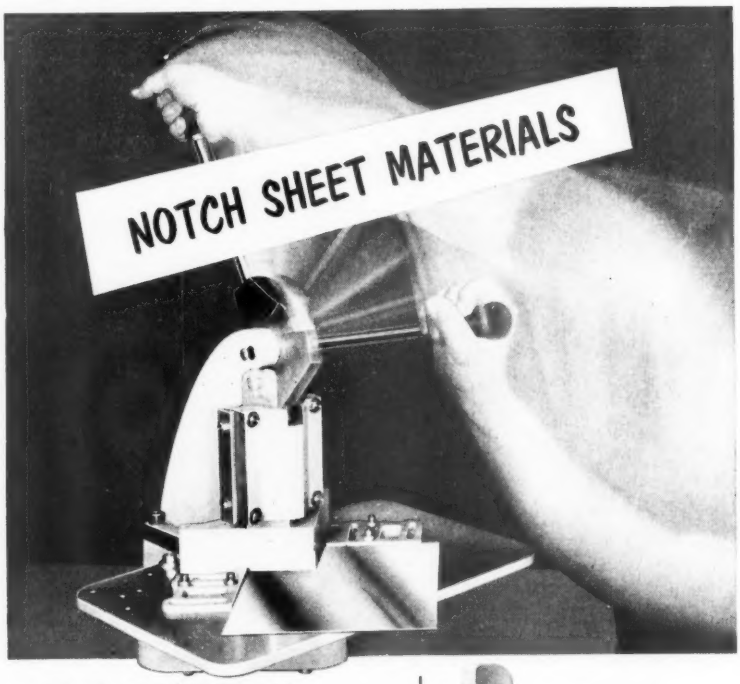

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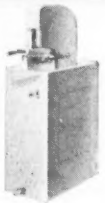

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Check this carefully. It can bring new efficiency to your operation. The newest in machines, tools, and accessories.

Everything You Need to Know About Bushings.
Write Ex-Cell-O for this Bushing Guide—as many as you'll need.
54-6

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for your Engineering and Purchasing Files

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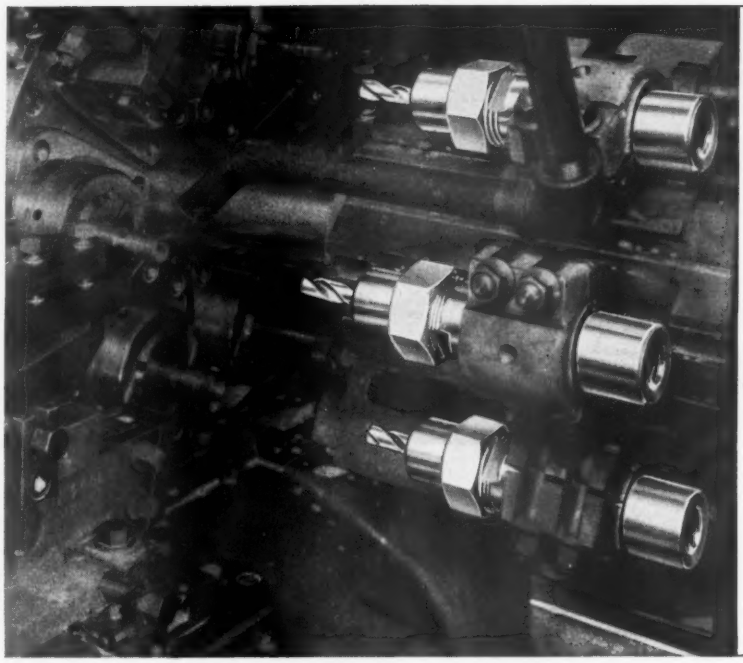

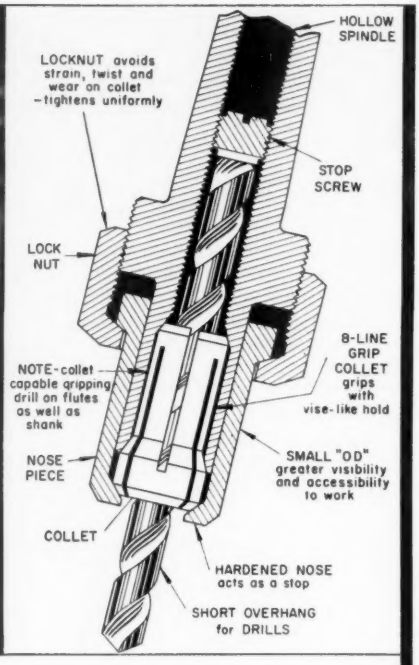
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LOCK NUT
8-LINE GRIP COLLET grips with vise-like hold
NOTE-collet capable gripping drill on flutes as well as shank
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SMALL "OD" greater visibility and accessibility to work
COLLET
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2. Guaranteed accuracy of .0005".
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5. Permits greater feeds and speeds.
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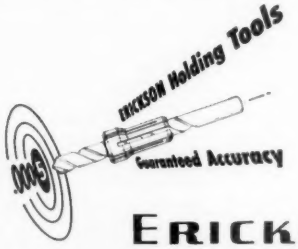

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CIRCLE INFORM-A-GRAM KEY NO. 42

the die engineer

In this, our 8th Annual PRESS DIES and STAMPINGS Feature Issue, it is most fitting and proper that we pay tribute to the man who is responsible for the great accomplishments that are attained daily in the pressworking of metals — the die engineer.

To say that he is a man who has served a long and rigorous apprenticeship in order to attain a high degree of craftsmanship is far from enough.

To say that he is an artist, with creative ability and talent, whose tools are of his own design and making, and who can so manipulate those tools as to transform a designer's sketch or blueprint into a finished metal component is a rather flowery statement which, although true, still does not convey the full and true significance of the die engineer's place in the industrial world, nor of the depth and diversity of his know-how.

It is difficult to build a picture of an engineer without an understanding of what he is an engineer of. This leads to the necessity for defining the field of die engineering in order to appreciate what manner of man it takes to meet the specifications.

We find that a masterful definition of die engineering has been given us by Edward A. Reed, Assistant Chairman, Industrial Engineering Department, General Motors Institute. In only sixty words, he has stated the complete case for die engineering and all of its ramifications. Mr. Reed says:

"The fundamental concept of die engineering for the manufacture of pressed metal parts is that when metals are plastically worked, resisting forces are created as a result of the flow characteristics of the materials; therefore these forces or their components must be controlled by the use of dies and equipment to obtain parts of specified size, shape, and mechanical properties."

There we have in those sixty words the clue to the vast store of knowledge that the die engineer must be thoroughly conversant with in order to "transform a designer's sketch or blueprint into a finished metal component."

He must know the fundamentals of metallurgy in order that his "plastically worked" metal may result in an end product of proper performance and lasting satisfaction. Grain size, grain structure, grain growth, rate of strain-hardening, and the effects of hot and cold working are behavior characteristics of his piece of metal which he has to be able to recognize and put to good use.

For the die engineer to know that "resisting forces are created as a result of the flow characteristics of the materials", as stated in Mr. Reed's definition, is something he has learned from sometimes sad experience. Consequently, he has had to build a store of knowledge around the physics of tensile and/or compressive stresses and other mechanical strains occurring at the various rates at which the metal is worked by cutting, forming, drawing and extrusion dies. The die engineer must be able to define these forces mathematically and to apply them graphically to the layout of the metal component.

Because "these forces or their components must be controlled by the use of dies and equipment", the engineer specializing in die designing and construction must finally, in order to bring his sheet metal parts to specified size and shape, select dies and equipment which will control or eliminate such factors as wear, dirt, deflection, stock variation and thermal effects in the workpiece.

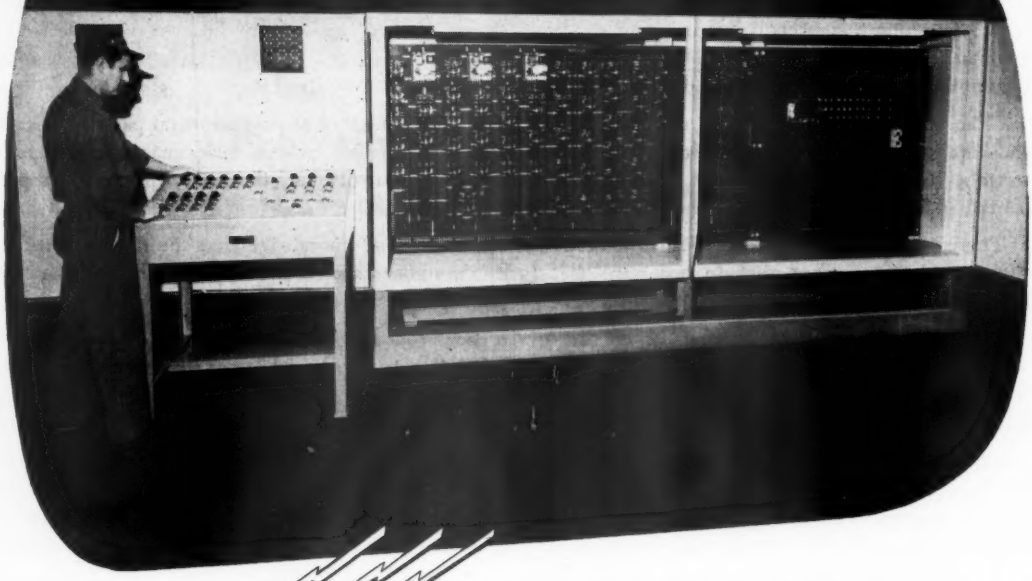
In addition to knowing whether the specifications of size, shape, and mechanical properties *can* be met, the die engineer must be able to satisfy himself that they *have been* met. To do this he must draw on his working knowledge of inspection and quality control; he must be able to prove the fruits of his efforts.

The die engineer is a man of stature and attainment in the world of metalworking. We are truly grateful for the opportunity that Edward Reed's concept of die engineering has afforded us to pay this tribute to the man who has made die engineering possible — the die engineer.

E. Willard Pennington

editor

Barth
DESIGNS & BUILDS *Electric* CONTROL PANELS



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PRESS WORKING THE ALUMINUM ALLOYS

by Lester F. Spencer
Metallurgical Consultant
Kensington, Connecticut

THE ALUMINUM ALLOYS are readily fabricated into a variety of shapes by any of the conventional methods available for forming. However, due to the variety of alloys that can be used for press working in addition to the various tempers and structural conditions that are available, it can be readily appreciated that the formability of these alloys, as a group, will vary considerably.

A rough indication of the formability of a specific alloy can be obtained by the values given for elongation along with the spread between the yield and tensile strength. A comparison of these values with the values of a known performance of an aluminum alloy will indicate the permissible deformation without rupture.

In general, formability will improve as the spread between the yield and tensile values increases and with the increase in the elongation values. Evaluation of some aluminum alloys in regard to formability is given in Table I; the comparison being made of alloys within the same temper classification.

The aluminum base alloys can be classified as those that can be heat treated and those that can be hardened by cold working. In the latter category, the non-heat treatable alloys, the maximum formability is obtained in the fully annealed condition. Since the tempers available, which will range from the H12 (¼ hard) to the H18 (full hard) tempers, are obtained through the medium of cold work, the formability of the alloy will decrease as the temper of the material increases in hardness. Within this group are alloys 2S, 3S, 4S, C50S and 52S. Alloy 2S, commercially pure aluminum, is frequently used in the fully annealed condition ("O" temper) for very severe deformation without the use of an intermediate anneal.

However, alloy 3S-0 is selected instead of 2S-0 where conditions of forming will permit, due to the fact that the "non-earing" qualities of this alloy can be used to advantage. Thus, occasion has arisen where drawn shells made from 2S-0 were characterized by excessive earing to such an extent that on subsequent trimming to specified height of shell, the fully developed ear had not been removed.

In this specific case, a beading operation could not be accomplished due to the lack of stock in certain areas. This resulted in that these shells had to be scrapped. Where non-earing quality is required for deep drawn shells, it is suggested that it be so specified on the blueprint.

Although fully annealed temper is recommended for severe forming operations, the non-heat treatable alloys in either the H12 and the H14 (½ hard) tempers can be used for moderate forming operations. However, final judgement as to both alloy type and temper should be based upon performance with the tools to be used in production.

In one particular case, a trial lot is obtained sufficient to have a test run of from 50 to several hundred items, the quantity depending upon the method of forming and design of part, before a decision is made to change either the alloy or temper. In some instances, where the required form is very close in design and operational procedure to a workpiece which had been previously changed in regard to either alloy or temper, such an experimental run may not be necessary.

The heat treatable alloys, among which would be alloy types 17S, 24S, R301, R353, R361, etc., are employed where either a high strength value or high corrosion resistance is required. As a general rule, a number of these

Table I Formability and Mechanical Properties of the Aluminum Alloys (a) (Ref. 1)

Alloys* and Tempers**	Forming*** Classification	Shear Strength, psi	Yield Strength, psi	Ultimate Tensile Strength, psi	Elongation, %
2S-0	Class I	9500	5000	13000	35
3S-0	Class I	11000	6000	16000	30
4S-0	Class III	16000	10000	26000	20
C50S-0	Class I	14000	8000	20000	28
52S-0	Class II	18000	13000	28000	25
61S-0	Class II	12500	8000	18000	22
24S-0	Class II	18000	11000	27000	19
R301-0	Class II	18000	10000	25000	21
75S-0	Class IV	22000	15000	33000	17
2S-H12	Class I	10000	14000	15500	12
3S-H12	Class I	12000	17000	19000	10
4S-H32	Class IV	17000	22000	31000	10
C50S-H32	Class II	16000	20500	24500	10
52S-H32	Class III	20000	27000	34000	12
2S-H14	Class I	11000	16000	18000	9
3S-H14	Class II	14000	20000	22000	8
4S-H34	Class IV	18000	27000	34000	9
C50S-H34	Class II	17000	24000	27500	9
52S-H34	Class III	21000	31000	37000	10
2S-H16	Class I	12000	19000	21000	6
3S-H16	Class II	15000	24000	26000	5
4S-H36	Class IV	20000	31000	37000	5
C50S-H36	Class II	18000	26000	29000	8
52S-H36	Class III	23000	34000	39000	8
61S-T4	Class II	24000	21000	35000	22
2S-H18	Class I	13000	22000	24000	5
3S-H18	Class II	16000	27000	29000	4
4S-H38	Class IV	21000	34000	40000	5
C50S-H38	Class II	19000	29000	31500	7
52S-H38	Class III	24000	36000	41000	7
61S-T6	Class II	30000	40000	45000	12
R301-T3	Class III	37000	40000	63000	20
24S-T3	Class I	41000	50000	70000	16
75S-T6	Class II	49000	72000	82000	11
R301-T6	Class I	41000	60000	68000	11

Notes:

(a) All mechanical properties and elongation values are typical. Elongation values are based on 2 inch gauge length on 1/16 inch thick specimen.

* Alclad (clad) alloys are not listed; if considered, use same forming classification as shown for the bare alloys having the same alloy symbol. Mechanical properties of Alclad alloys are slightly less than those of the same bare alloy. Elongation values are approximately the same.

** Mechanical properties of "F" tempers are not guaranteed therefore these are intentionally omitted.

*** Class I rated material has best formability in its respective temper group; Class II is next best; etc.

alloys, when in the annealed condition, have good formability characteristics, but since the rate of work hardening is considerably more, a sequence of operations, as exemplified in deep drawing procedures, may necessitate the use of more frequent intermediate anneals.

These alloys are heat treated to obtain maximum strength; the operation consisting of a solution heat treatment followed by an aging either at room or elevated temperatures. Where the alloys are solution heat treated, it is advisable to include an operation, such as re-striking, so as to eliminate any distortion that may have taken place in the solution quench. At this stage, the alloy is very easily worked; the procedure of solution treatment and working prior to aging resulting in an increase in mechanical properties, especially yield strength, which is used to advantage in aircraft work.

The time period between solution quench and aging is of importance since the workability of the alloy decreases as aging proceeds;

this factor of time being of particular importance with those alloys which age at room temperature. Distortion realized during solution quench may be overcome by overforming when producing the part. On exceptionally long or complicated parts, it may be necessary to hand work to eliminate distortion.

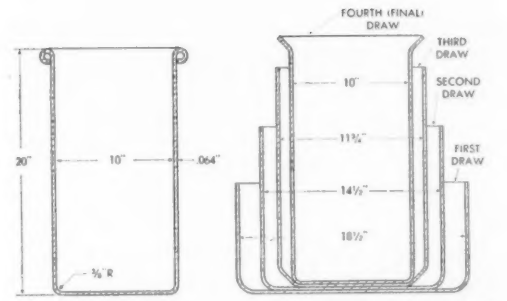
Due to the fact that the aluminum alloys are comparatively soft, precaution should be taken to protect the surface against possible scratching or abrasion. Aluminum sheet and coiled stock are usually received suitably protected. Where it is necessary to break a bundle or coil the remaining stock should be protected against dust or dirt accumulation. If this precaution is not observed, difficulty from either damaged tooling, undesirable pick-up or embedment of foreign matter on formed aluminum surfaces may result. It should be remembered that the aluminum alloys will tend to water stain which calls for both storage in a dry place and the placement of stock on skids.

Drawing Procedures

The drawing operation is perhaps the most widely employed press operation. The sequence of operations to produce a completed part may often include one or more auxiliary operations such as curling, beading, bulging, spinning, etc. Although these auxiliary operations are not within the same classification as press drawing, they will be considered with press drawing since they usually follow in the sequence of operations.

In actual practice, many shallow drawn parts can be produced successfully on single action mechanical presses; however, due to the better control of blank holding pressure, either the double action mechanical press or the hydraulic press is the preferred for the drawing of relatively deep shells. Where a single action press is employed and no blank holding provisions are made, the material to be formed should be sufficiently heavy to prevent wrinkling. Where the thinner gauges are to be press drawn, sufficient pressure to prevent wrinkling can usually be obtained by the use of either an air cushion or by the use of springs incorporated within the tool design.

The press speed for drawing will be dependent upon both the shape of the proposed shell and the depth to which it will be drawn. In



Courtesy Reynolds Metals Co.

Fig. 1. Typical sequence of drawing operations on an aluminum cylindrical shell (3S-O).

addition, the relative ductility of the alloy must also be considered. As a guide, a deep drawn shell produced from a ductile alloy should be drawn successfully at a maximum ram speed of 100 feet per minute. The less ductile alloys may require lower ram speeds, usually around 30 feet per minute.

Blank holding pressures on mechanical double action and hydraulically operated press equipment must usually be determined for each specific job; this value should be sufficient to prevent the formation of excessive wrinkles. In regard to clearance between punch and die, this value should be sufficient to permit free metal flow between the tool surfaces; the values in Table II being used as a guide.

Another factor to consider is that of punch and die radii; the minimum suggested value being four times the thickness of blank, but values in excess of that may be required. The importance of this latter factor cannot be overemphasized; too liberal a radii will cause wrinkling on the side walls of the shell; whereas too small a radii may cause fracture.

. . . Continued on page 172

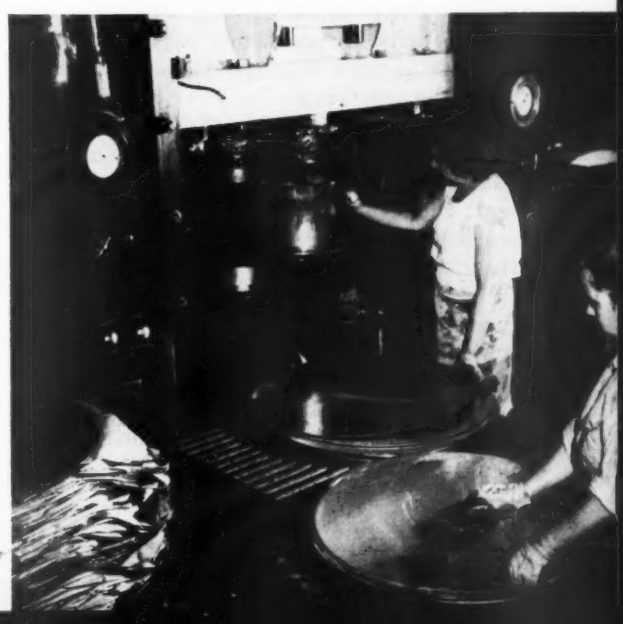


Fig. 2. The first cupping operation on the smaller of two washing machine tubs used in "Easy" washers. A 29" blank is drawn to a cup of 15" dia. x 11" deep.

Courtesy Reynolds Metals Co.

LIFTERS FOR AUTOMATIC DIES

by Ernest J. Urbas
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Cleveland, Ohio

AFTER BUILDING an automatic cut and carry die, the final tryout before approval of the die for production brings the tense moment when the press and its tooling are engaged for the first time in the automatic cycle; when months of pains-taking labor are given the supreme test.

Now, for the first time, those parts of the die which contribute nothing to the shape of the piece part are called upon to perform their tasks in a proper manner and sequence. The lift mechanism comes into play at this critical point to lift the operational strip out of the die cavities at the exact moment to allow the feed mechanism to advance the strip its proper pitch distance throughout the length of die and yet not impede the movement of the strip by snagging, dragging or tipping any of the drawn shapes or forms. Naturally, any such obstructions can so distort the shape of the strip as to cause improper pickup or locating, with the net result of a jam-up or, worse, a damaged tool.

In the lift methods described, the author has endeavored to show standard stock components wherever possible as is evidenced by the variety of uses made of the common stripper bolt. In addition to what can be gained by the subsequent detailing of these different lift methods, the author would like to point out a number of practices which will contribute further to the successful use of lift mechanisms.

Whenever a spring is used around a stripper bolt, the inside diameter of the spring should permit a slip fit over the body of the stripper bolt. Some spring manufacturers have followed this practice, i.e., their winding rod diameters correspond to the body sizes of stripper bolts.

If the spring is to be pocketed in a recess in the die, the corners of the recess should be rounded off so that the spring during its compression will not catch in the corners of the recess. Constant rubbing in a sharp corner will cause the spring to crystallize and eventually break.

Always use a spring of standard stock length. Never grind a spring down to make it a certain length. A hand ground spring should never be used in a high speed production die.

Greasing or lubricating the stripper bolts or recessed spring pockets is just as important as lubricating the machine itself.

A recessed spring pocket should never be a tight fit around the spring.

For continuous long run operation, bronze bushings should be inserted into the die shoe wherever a moving part can possibly wear out, such as where stripper bolts pass through the shoes. Periodic replacement of the bronze bushing brings the die back to its original condition.

In the building of automatic dies that are continuously operated year in and year out, no springs whatever are employed; air cushions being used throughout to supply the pressure medium.

The type of pressure lift shown in Figure 1 is commonly found (or is attempted) in automatic cut and carry dies and leaves little to be gained or desired. Because the spring is housed completely in the die, the overall spring length is reduced to a point where high speed press action will lead to ultimate spring failure. To aid in attaining continuous production in spite of this shortcoming, the die block should be made so that it can be removed from the die shoe in order to facilitate the replacement

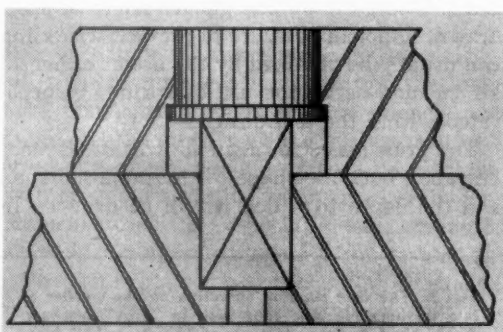

Figure 1

of the broken spring. This should be accomplished without removing the die from the press. Where, however, the stroke of the press does not permit easy removal of the die block another style of lift is necessary.

If it is found that the pressure lift shown in Figure 1 is not successful because of continuous spring failure, the next step would be to embody the design features shown in Figure 2. Here, the pressure pad is bored as deep as possible to house one end of the spring, while the die shoe is drilled clear through. Thus we gain additional length of spring. A plate, mounted underneath the die shoe, provides a surface upon which the bottom of the spring rests. The hole in this plate permits the escape of entrapped air. With this lifter design we have a method whereby if spring failures occur, or if the draw die edge needs to be polished, the simple removal of the lower plate allows the spring to drop out of the die and the pressure pad to drop well below the draw edge. All of this can be performed without removing the die from the press if the press bed or bolster opening is large enough.

The type of lift shown in Figure 3 offers the unique feature of easy removal of not only the pressure spring but the pressure pad as well with either a long or short stroke press. The pressure pad has two drilled and tapped holes diametrically opposite one another. If trouble ever occurs and it is necessary to remove either the pressure pad or the spring, two screws are inserted in the tapped holes and a bar or rod is placed between them. By holding a socket wrench in the stripper bolt head underneath the die and by applying force in opposite directions to the wrench and bar, the stripper bolt can be removed. Then the pressure pad can be lifted out of the die opening by means of the two screws. If the stroke of the press is long enough, the spring can also be removed from the opening. If a short stroke press is used, only the pressure pad can be removed in this manner. The spring would have to be dropped through the lower part of the die by removing the plate as in the design shown by Figure 2. Oil and other die lubricants that have collected underneath the pressure pad are forced down through the bottom of the die and through the stripper bolt opening by the escaping air. It is highly desirable to incorporate this type of pressure pad especially on dies that have to be stored during periods of nonuse. This is because drawing compounds and condensation will erode or etch the die openings and pressure pads causing them to score or stick. With this simple method, the dies can be cleaned for storage just by removing the pressure pads. Care must be taken with this pad arrangement that the pad does not unscrew from the stripper bolt while the die is running.

Figure 4 features a type of lift which permits the removal of both pressure pad and pressure

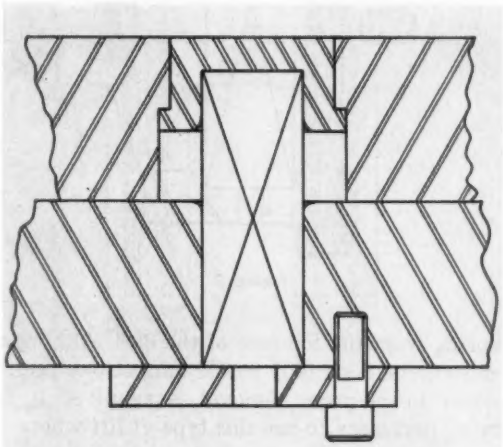

Figure 2

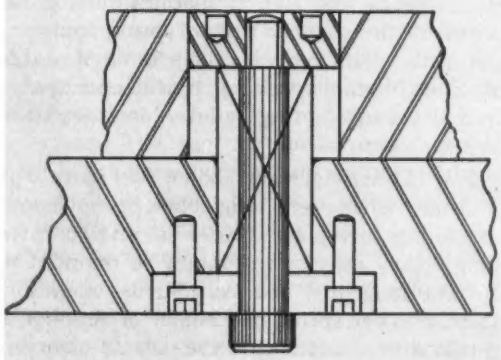

Figure 3

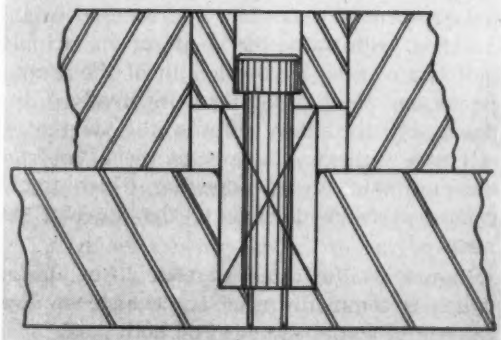

Figure 4

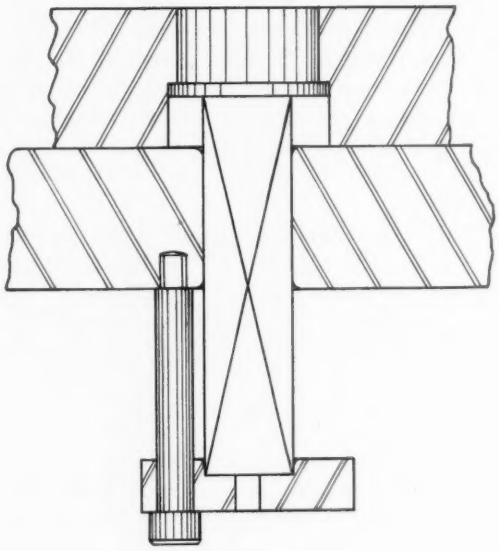

Figure 5

spring from the top face of the die. Although this can be done only in the long stroke press, when in-the-press removal is required it is often necessary to use this type of lift where a particular station is located over a solid portion of the bolster or die bed opening which would make the station inaccessible for removal of the stripper bolt or spring from underneath. It is very desirable to employ this style of lift whenever short movements are required because spring failures are very rare in such cases.

The lift arrangement shown in Figure 5 is desirable whenever a long action or movement of the pressure plate is essential and an extra long, heavy duty spring might be required to sustain long life and continuous operation. Here, a lower spring pad holder or retainer is recessed to accommodate the outside diameter of the spring thus preventing the spring from slipping. Three stripper bolts are usually passed through this plate and secured to the die shoe. Naturally, the length of the stripper bolt is governed by the length of the spring. Because of the heavy duty work involved, the flange on the lifter affords the degree of strength necessary to prevent the lifter from escaping into the die opening which might cause extensive damage to the die and the press.

Figure 6 illustrates a stock lifter design which is commonly used and which employs the use of a stud threaded on both ends. One end, threaded a short distance, is screwed into the die shoe while the other end, threaded for greater distance, enables the adjusting nut to increase or decrease the spring pressure as the case may be. The spring pad collars are made with hubs which fit closely to the inside diameter of the spring. The center hole is made to slip over the stud. This assures positive and equal distribution of the spring pressure. The pressure pins have heads which prevent them from dropping out. In as much as the spring assembly is installed after the die is set in the press, the pressure pins would be difficult to handle if they had been made without heads. The pressure pins are made in sets of three, thus acting as a tripod which will correct any minor inaccuracies in length. The "economy" type pin shown is made from drill rod with a peened head; the other style shown is made from a standard stripper bolt by removing the threaded portion. The latter is a standard stock item and provides a generous size head to prevent sinking into the lifter pad.

The type of lift mechanism detailed in Figure 7 features an excellent method of pressure pin installation, assuring uniform length, easy removal and accurate guidance of the pressure pins. These pressure pins are made from standard stripper bolts by grinding the head diameter down to the body size. This leaves a straight pin with a shoulder thread on one end and a socket opening on the other for positive installation. It is customary to employ three of these pins in a pressure unit; tightening them into the spring pad and then grinding

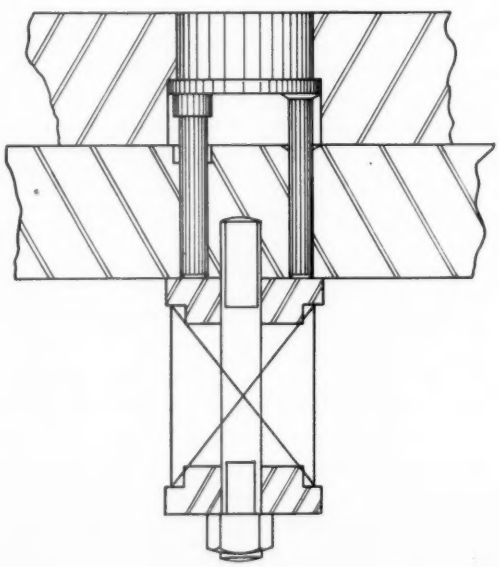

Figure 6

the tops of all three pins. This assures equal overall length of all three pressure pins. The three pins, being secured in the spring pad, afford a positive up and down movement during the spring action, consequently very little wear is evidenced on either the pressure pins or the pressure pin holders.

The type of lift that represents the ultimate that can be achieved in automatic die operation wherein a large number of operations are involved is shown in Figure 8. Here a lift plate is used underneath the die and each station lift is actuated by this pad. This method, with its minimum number of parts, allows simultaneous action at each and every station requiring a lift including any lifters that might be located beyond the die or press bed openings. Although the springs that operate this unit are necessarily confined within the area of the bed opening, the pressure plate can extend beyond the opening and thus actuate the lifts in those areas which are not otherwise accessible, providing that parallels are used under the die to allow movement of the lift plate.

In automatic operations, it is often desirable in some stations that the pressure pad be out of the way in order to permit partial or full entrance of the drawn shapes. This style of lifter performs this much desired function. The mechanism operates in this manner: on the downward press stroke the movable spring stripper, which is mounted on the upper part of the die, contacts the pressure pins and, as the press continues its downward stroke, these pusher pins move down through the die pushing the pressure plate down. In turn, the pressure pads or lifts of the individual die stations, being secured to the pressure plate, also move downward. The length of the downward movement is governed by the distance the pressure pins protrude above the die. Different techniques may be employed at the various die stations because of the style of lift unit required, but basically the lifting apparatus would not be changed.

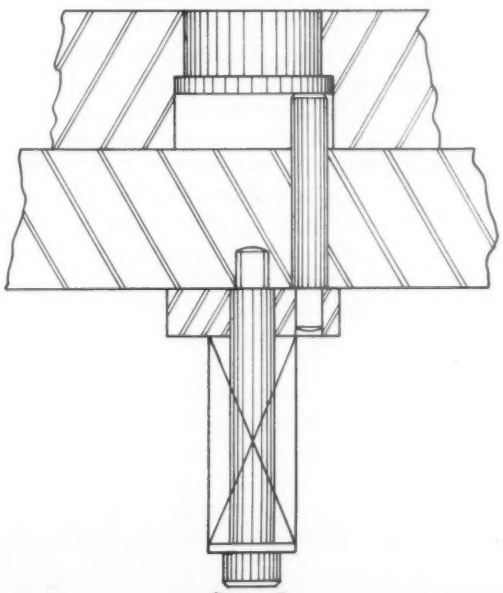

Figure 7

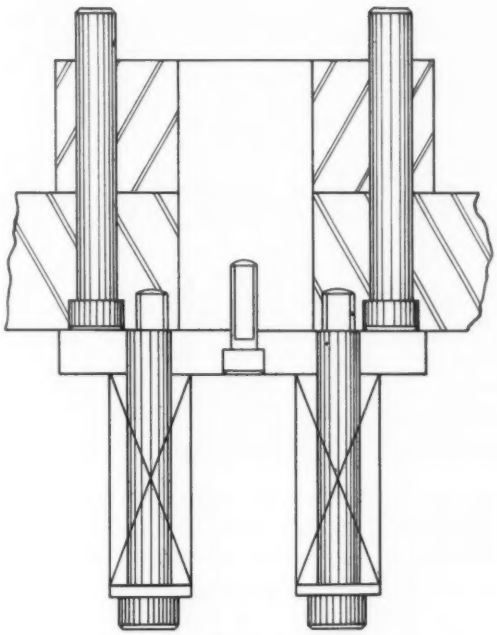

Figure 8

Naturally, the pressure that is required on the movable stripper on the upper part of the die must be great enough to counteract the total lifting spring pressures so that the latter will not "back up" and raise the movable stripper.

Note that the pusher pins shown are made from stripper pins with the threaded portion removed. The head prevents the loss of the pins during the handling of the die in the shop and, in addition, the heads prevent the pusher pins from ever being pulled up out of their openings in a long stroke press, which would cause considerable damage. Plain straight pins made from drill rod could be used in a short stroke press without this danger.

"... improved efficiency resulting from a safety device is a by-product which also contributes to the over-all saving . . . for only the safe job is a good job."

The Elimination of Safety Hazards in Press Operations

by Charles E. Meldrum
Brown-Lipe-Chapin Division
GENERAL MOTORS CORPORATION
Elyria, Ohio

THE SAFETY HAZARD of punch press dies clamping shut is a familiar one to plant operators, machinery manufacturers, and safety organizations alike. Elimination of this hazard is frequently sought through such means as two-hand controls, safety pliers, handcuffs, and various types of guards. Usually, however, the design of special safety devices and the sound application of methods engineering are required to solve the safety problems of punch press operations — each of which is likely to be different.

At the Elyria plant of the Brown-Lipe-Chapin Division, a study of punch press operations was initiated to determine how to eliminate the safety hazards. The recommendations of the study were then put into effect with gratifying results. During the year 1952, not a single lost-time accident was incurred on a punch press.

The study first determined the location of the hazardous operations and then was devoted to (a) use of mechanical loading and unloading devices, (b) standardization of die design for safety purposes, and (c) safety guard design.

Before describing how the hazards were eliminated, it is appropriate to examine the organization of safety activities at the Elyria plant.

In addition to the safety staff, every employee of the plant may find himself involved in some safety activity at one time or another. First of all, there is the plant suggestion system through which employees may submit safety ideas.

Secondly, specific safety jobs — like eliminating the punch press hazards — involve the specialized knowledge and services of certain employees such as a toolmaker, a maintenance man, and a process engineer.

A third participation in safety by employees is a safety meeting held by three separate groups, each on a monthly basis. These groups are known as a foremen's group, a utility men's group, and a policy group.

Members of the management staff are present at the meetings of all three groups making it possible for safety information to flow downward and for suggestions to flow upward. The meetings are held on an informal discussion basis, with the result that every man has a chance to talk freely about new safety proposals and about any questions or suggestions com-

Table 1

PRESS OPERATION
CHECK SHEET FOR SAFETY

1. Type of press (C-frame) (toggle action) (horning and wiring) (straight-side) (other)
2. Type of Clutch (mechanical) (air)
3. Speed of press
4. Type of material used on operation (sheet) (coil) (parts in process) (blanks) (other)
5. Size of material
6. How is material brought to operation?
7. How is material stored at place of operation?
8. How is material fed? (pliers) (suction cup) (special tool) (mechanical, air or hand slide) (gravity slide) (automatic) (other)
9. Does any part of operator's body enter the danger zone while loading or unloading? (yes) (no) If yes—what part? ( )
10. How is the press put into operation? (foot) (one hand) (two hands) (other)
11. If press is two hand control, must operator hold both buttons until die is closed? (yes) (no)
12. How is part removed from die? (air) (mechanical) (hand-using tool)
13. How is trim or offal disposed of? (mechanical) (air) (hand-using tool)
14. Where is completed piece placed? (chute or conveyor) (table) (tub or container) (stacked on floor) (other)
15. Do you feel operation is safe?
16. If answer to 15 is NO—explain
17. What suggestions do you have for improvement?

Location of Press _____
Checker _____
Date _____
Department _____

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ing from his department. Brief minutes of these meetings are kept so that no idea is overlooked. A strict follow-up is maintained.

HAZARDOUS OPERATIONS

In initiating the study of punch press hazards it was recognized that to prevent accidents involving the loss of fingers or thumbs, press operations must be performed in such a way that it is neither necessary nor possible for operators to get parts of their bodies between pinch point areas in punch press dies. The operations were examined, therefore, to determine the feasibility of using mechanical loading and unloading devices.

The first step is to recognize where the hazards exist. This was accomplished by means of a safety check sheet (Table I). The histories of all lost-time press operations were reviewed to determine the cause for each accident that occurred. The information obtained was used to develop the questions on the check sheet.

The most common causes of accidents which previously occurred in the punch press department are listed below:

1. Placing hands in "pinch point" areas
2. Improper placing of hands
3. Using hands instead of clamps
4. Placing pieces improperly
5. Fastening down one button of a two-hand control
6. Handling and turning dies over on die tables or on the floor
7. Insufficient operator training or follow-up by supervision
8. Using hands or fingers instead of safety pliers or other equipment provided
9. Two or more persons operating a press
10. Failing to keep safety guards or equipment in repair
11. Failing to keep work area clean
12. Failing to concentrate on operation while performing same
13. Mechanical failure of press

MECHANICAL LOADING AND UNLOADING DEVICES

Mechanical loading and unloading of punch presses is advantageous from both an efficiency and a safety viewpoint. For efficiency, the punch presses can be set to run at their maximum strokes per minute without having to stop while an operator takes out one piece and inserts another. For safety, the device is performing the operation; therefore, the operator is not exposed to danger.

Costs of mechanical loading devices vary widely due to differences in the service performed. Some devices may consist of only a few relatively simple sheet metal parts; others may be fairly complex and cost several thousand dollars. However, the equipment soon pays for itself through eliminating the possibility of accidents. In some cases the improved efficiency resulting from a safety device is a by-product which also contributes to the overall saving. Most important, however, is the tremendous value of protection to workers against hand injuries, for only the safe job is a good job.

Fig. 1. Blanks are located on the die by this hand slide feed. The operator's left hand guides the handle of slide while the right hand presses the control button located out of the picture.

The various types of mechanical loading and unloading devices which are in Elyria plant are as follows: Hand operated slide feeds; gravity type slide feeds; power operated slide feeds; magazine type feeds; automatic coil feed; iron hands; and conveyor feed and automatic removal.

Hand Operated Slide Feeds

The hand operated slide feed is one in which the part is loaded outside the danger zone and then pushed by hand, taking the part to the point of operation.

An example of this type feed is applied to the draw operation for a radiator grille moulding. Before the feed was installed, the die was put into production with a cage type guard and the following operating method was used:

1. Pick up blank and insert into pliers
2. Insert blank into die with pliers
3. Remove pliers and step on foot pedal to operate press. Upon completion of the press cycle, the part was blown off the die and into a chute which guided it to the next operation.

A hand operated slide feed was attached to this die and the operating method changed to the following:

1. Place blank on slide with left hand and push slide to stop
2. Pull slide back to start position and step on foot pedal.

Safety was improved because the opening in the cage type guard could be decreased to the thickness of the slide. This made the opening smaller than that necessary in the former guard for opening the pliers to release a blank. The result was an effective restriction to a worker's hand entering the die area.

Production was increased because several blanks could be held in the operator's hand preparatory to placing them directly into the feeder; whereas, with the use of pliers, only one blank could be handled. Furthermore, the feeder located the blank automatically against locators on the die. With the pliers it was necessary for the operator to position the blank against the locator. A typical hand slide feed is shown in Figure 1.

Gravity Type Slide Feeds

The gravity type slide feed is a simpler and cheaper device than hand or power operated slide feeds. Attached directly to a die, it guides the parts themselves into the die. The slide is shaped to hold parts in the proper location for their entry into the die, and its application is limited to parts of such shape that they will slide easily and locate themselves in a die. In addition to the chute type, gravity slide feeds are sometimes made of rollers as in a gravity roller conveyor.

Slides on which the operator pushes one part with another part are considered gravity slide feeds.

The gravity slide feed is safest if used in conjunction with a cage type guard which has an opening large enough for the part but not large enough for fingers. If the opening must be large, the operation can still be safe if the operator has to be at arm's length away from the danger zone to operate the press.

Fig. 2. Side view of press shows the start of a trim operation on a bumper guard. The bumper guard is located in a nest ready to be moved into the press by the power operated slide feed.

Power Operated Slide Feeds

Power operated slide feeds using air have been installed on bumper-guard trim presses for several years at Brown-Lipe-Chapin and have proved to be 100% safe. Previous to their use, operator protection was provided by a sweep guard used in conjunction with a cage guard. The operator was required to place the bumper guard on the horn of the die and then pull a clamp into position which held the part while he stepped on a foot pedal to operate the press.

With the power operated slide feed as shown in Figure 2, the operator places the part on a nest which holds the part in proper position for entry into the die. He then must use both hands to press the slide operating buttons. The buttons operate an air cylinder which pushes the part onto the die. The punch press cycle is started by switches which are located so that the slide depresses them when the part is properly located on the die. If the operator removes either hand from a slide operating button before the press operating switches are depressed, the slide will return to its starting position and the press will not cycle.

After the press ram has gone past bottom center, the operator removes his hands from the buttons and the slide returns with the completed part. The offal is blown out of the rear of the die onto a chute, finally dropping into a scrap bin.

Magazine Type Feeds

The magazine type feed gets its name from the fact that several parts are stacked into a specially designed holder and mechanically fed into the punch press from the holder.

This type feed is excellent from a safety point of view as there is no necessity for an operator to place any part of his body between

dies. It also has advantages from a production viewpoint because the feeder can be synchronized to work with the speed of the punch press.

The magazine can be made large enough to hold a definite number of parts which will keep the press busy for a specific length of time. During the time the magazine is unloading, the operator may be kept busy on a similar operation or some other duty.

A typical use of the magazine type feeder is on a press operation for an automobile hub cap body. The feeder, which is attached to the front of a Bliss No. 28 punch press, is loaded with flat, 11″ dia. blanks of 0.028″ cold rolled steel. As the starting lever is depressed, the feeder slide advances and deposits one blank in position on the die. When the feeder retracts and is clear of the die, it engages the press operating lever which causes the press to make one cycle. At the end of the press cycle, the completed part is ejected by air through an electric-eye beam. When the beam is broken, the entire operation is repeated.

To prevent die breakage due to two blanks being fed at one time, the thickness of the feeder slot, through which the blanks pass, is held to a dimension less than the thickness of two blanks. Satisfactory performance of this feeder also requires that the blanks be flat, free of burrs, and have constant thickness.

About 1,000 blanks at a time, enough for a one-hour run, are loaded on this feeder. To compensate for the decrease in weight of the feeder as the blanks are used up, a constant pressure is applied to the stack of blanks by means of an air cylinder.

Automatic Coil Feed

Automatic coil feed, as the name implies, feeds stock to a press from a coil instead of in short strip lengths. Two types of commercially-available coil feed machines are used. The type illustrated in Figure 3 is used in conjunction with blanking operations for bumper-guard blanks, and also with blanking and forming operations on anchor plates.

Previous to installation of the coil feed equipment, these operations required the purchase of stock in lengths about 10′ long so that the stock could be handled by the operators. After the coil feed equipment was installed, the slower, more difficult method of hand feeding was eliminated.

Savings were realized in (a) material, due to buying coil stock instead of strip stock, and (b) in labor cost.

Fig. 3. Coil stock is fed from machine at the right into the blanking press. Completed blanks are blown by air blast onto a conveyor at the rear of the press, and the scrap drops into a tub making the operation entirely automatic.

A second type of coil feed is used in conjunction with presses and dies to produce stainless cap mouldings and steel inner bars for front-end grilles.

In the case of the stainless cap moulding, the die is designed to blank and form the piece. The formed piece is blown from the die against a limit switch and then drops to a conveyor belt. The action of the piece against the limit switch causes the press and feeder to repeat their operations, and thus make the operation automatic and continuous at the press-strokes-per-hour rate of 2,000. If a piece does not come out and hit the limit switch, the operation will stop until the cause for failure has been corrected and the press started again.

The safety of the automatic coil feed is apparent from the fact that cage type guards completely enclose the die, and further that no operator is needed except from reloading the feeder.

Iron Hands

The Iron Hand for removing parts from punch presses. It was originally designed for use on large parts such as automobile roof panels and fenders, but is now used in many plants on a variety of comparatively smaller, but awkward-to-handle parts.

Although some plants manufacture their own version of the Iron Hand, it can be purchased from a commercial source. Three sizes are offered for mounting on a punch press. These handle stampings ranging in weight from 20 lbs. to more than 100 lbs. at speeds of from 20

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SELECTING THE RIGHT DRAWING COMPOUND FOR THE JOB

IN THE COLD FORMING or drawing of metals there are many factors which have a bearing on the type of lubricant which is the most effective. These factors have resulted in the development of a variety of compounds for lubricating and cooling purposes.

Getting the workpiece properly formed with the least amount of scrap or excessive rejects is of course of primary importance. Serious problems develop if full consideration is not given to what happens to the piece after it leaves the press. Heavily pigmented compounds and those with active sulfur or waxes that cling to the metal may assist in doing a very fine forming job. But if these compounds cannot be removed in the cleaning process, the parts cannot be bonderized, plated, enameled or given any other finish which requires a clean surface.

This brings up questions about how the drawn parts are to be cleaned. Are they to go in a power washer using an alkaline cleaner? Or is a still tank being used? If it is a vapor degreaser, will all of the compound be readily removed? Frequently the compound must act as a rust preventive on the parts when they are being shipped to another plant. Some water soluble products are not too good for this type of treatment, particularly if the pieces are nested.

The selection of the proper compound for the job at hand can be somewhat simplified by having an understanding of the general types. There are three groupings which cover most compounds. Here is a description of the general nature of each.

Soap Compounds

First. Soap type compounds are made from fats and fatty oils combined with alkalies. These compounds are usually made in paste form and are diluted with water before applying. They most generally contain no mineral oils, although it is well to inquire whenever that is a factor. Either natural or synthetic fats can be used but the important thing is to get the right combination to give the proper film strength yet can be removed completely.

These compounds are recommended when the parts are to be bonderized, plated, enameled or given some other finish which must start with an absolutely clean surface.

The dry soap compounds are often used on heavy draws on parts which have to be enameled or plated. These compounds are readily dissolved in hot water. Steel sheets to be fabricated are first cleaned, then dipped in the soap solution, removed, and the water dried out before the sheets are stacked.

While the dry soap compound cost is usually less than other types, the total cost is frequently more because special equipment for applying and drying is often required. Extra labor is required to coat the sheets and they must be stored and handled more, which runs up the costs.

A mild alkaline cleaner will clean off the soap type compounds.

Pigmented Soap Compounds

Second. The general types are the pigmented soap materials. They are compounded with about the same soaps that are used in the first group but pigments are added to improve the film strength and drag. These inorganic and metallic particles take over the load when the fats and oils break down.

There is a very wide variety of pigments used including many of those that go into paints. They frequently have a strong affinity for the metal and are difficult to remove particularly if left to dry on the parts. Some of the compounds of this type can be cut back with water while others can be diluted with either oil or water. The latter has the advantage of having a better cooling action.

When oil is added, the compound will not dry out hard when left on the workpieces and the compound is easier to remove. Also, improved rust protection is given to the pieces

by Frank M. Aldridge
President
General Manager
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Cleveland 11, Ohio

when they are prepared for shipping.

These pigmented soap compounds are recommended for a very wide variety of uses. They handle light to extremely heavy draws and are very effective on stainless steels as well as on the heavier non-ferrous metals.

A good power washer with the right alkaline cleaner is the best and most satisfactory equipment for removing pigmented compounds. They will not degrease as satisfactorily because the pigments will not come off completely.

Oil Compounds

Third. This group is the oil type of compounds which are made with mineral oils combined with additives to increase the film strength and load carrying capacity. Many of these are made from the same materials used in making cutting oil bases. Both active and inactive types of sulfur are used. Chlorine, fatty oils, waxes and some metals are incorporated for various reasons. Most of the oil type compounds are not water soluble and because of this should be removed in a degreaser.

The oil type compounds are particularly easy to apply. They can be sprayed on or put on with a swab. They handle a variety of work from the heaviest types of draws on down to lighter ones depending upon the body of the material and load carrying qualities. Stamping, punching, cut off work are all done with liquid oil type materials. We have found considerable interest in an oil type compound which can be cut back with either water or oil. It will also clean off in an alkali cleaner or a degreaser and does quite a variety of jobs on all types of metals from light up to medium heavy draws.

An all purpose compound would be a great thing, and we are frequently asked to supply a universal compound. But the perfect one may never be developed since each shop or job is run by different people who have their own methods of operations to obtain the best results.

Through experimentation and use in the field we have found that our Beacon 133 will handle practically all the soap type applications from the heaviest on down to the lighter parts.

On stainless and mild steel drawings our Beacon 201 has very wide use. Television tubes and auto parts are being drawn with it regularly.

Aldraw 4550 comes nearer to being the all purpose lubricant. It is a viscous liquid of the oil type and does an excellent job in both ferrous and non-ferrous metals. The load carrying qualities are high even though it has no pigments.

This compound can be cleaned off of metal completely in any type of cleaner or degreaser and a good clean surface is obtained for enameling, plating or painting.

The reader may profit from a recent experience of one of our customers. He was doing a fine stainless steel drawing job on a contract basis and was using one of our pigmented compounds. Another firm had the contract covering the cleaning and plating. The plating contractor had a good power washer which gave him a perfect cleaning job which assisted in his delivering satisfactory plated parts.

For some reason, possibly price, the finishing contract was given to another firm who used a still tank for cleaning. This method was not very effective in taking off all of the pigments

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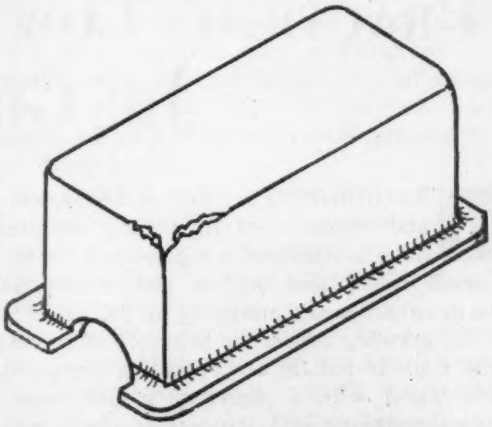
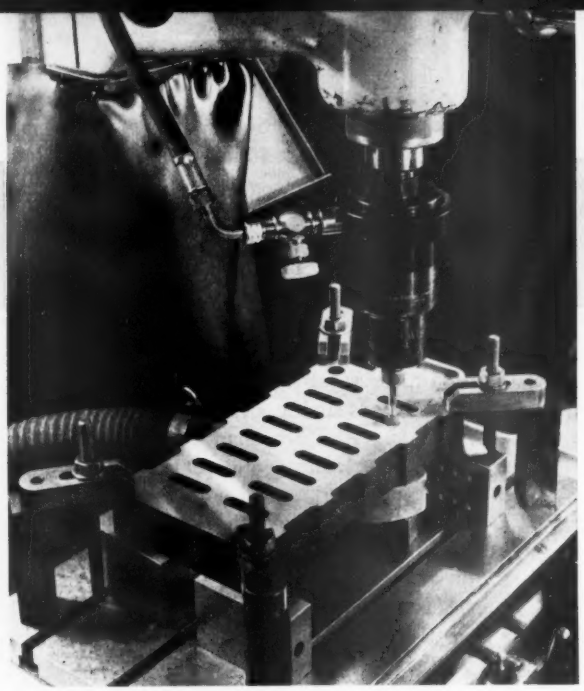


Fig. 1. The efficiency of a drawing compound lies in its ability to form a lubricating film between the metal being drawn and the punch and die, thereby avoiding a metal to metal contact in the drawing operation. Should this film break down and metal to metal contact develops, then rupture of the metal will occur at the area of bend as indicated in the sketch.

Fig. 2. The importance of absolutely clean metal surfaces in preparation for plating and enameling cannot be over emphasized. Experience has shown that a small speck of foreign material on a steel surface to be enameled or plated will eventually cause a small area of the finish to blister, as indicated in the sketch, and then break off. This fault in the finish is caused by the speck of material not permitting a proper bond to be made between the steel surface and the finishing material.



The jig grinder attachment greatly increases the versatility of the modern precision jig borer. Here, openings in a sectional die have end radii circular ground, blending into sides, by using the machine's front-to-back table movement.

by L. W. Jones
Vice-President
THE VULCAN TOOL COMPANY
Dayton, Ohio

PRACTICAL, LOW COST, PRECISION JIG GRINDING

JIG GRINDING is a logical development and extension of jig boring, enabling holes in hardened components to be corrected for size and location, just as they can be in unhardened material by jig boring.

Jig grinding adopts the principle of holding the work stationary and revolving the grinding wheel with a planetary motion which, when combined with the ease of accurate location inherent to the jig borer, enables precision work to be carried out with an economy otherwise unobtainable.

Previously, holes in hardened components which required correction for center distances, had to be set up with toolmakers' buttons, transferred to an internal grinder, each button indicated and the hole ground. Practical toolmakers will testify to the tedious procedure of setting up buttons, as also will the grinder operator relative to indicating each one until true running is obtained, and then grinding the hole. The slightest accident will disturb the setting of the buttons thus necessitating either a repetition of the whole tedious procedure or, even worse, the scrapping of a costly workpiece.

Contrast this with jig grinding—the work is located on the jig borer table in the usual way and each hole is ground in correct relation to all others by simply moving the jig borer table. Holes can be located and ground in an average of fifteen minutes each compared with an average of two to three hours each by the old method, depending upon the type of work. This is a very conservative estimate. Holes at compound angles present no difficulty, neither does the size of the complete component, provided it can be accommodated on the machine table.

The time saving feature alone represents a real step forward in the art of tool making, equal almost to the advent of the jig borer itself. Jig grinding is particularly useful in connection with the building of dies. Dies can be ground in position with all holes exact for location and size. The stripper plate and punch holder can be jig bored to the same dimensions so that the hardened die, stripper plate and the die holder all fit together without trouble.

This contrasts with the old method in which the die is made first and hardened. Hardening distortion is then allowed for by transferring any errors in location through to the stripper plate and die holder. In other words the three parts are made to suit each other instead of

to definite dimensions. Replacement of any of the three components is a difficult matter and, because the stripper plate and die holder cannot be made until the die is built and hardened, the manufacture of the complete tool is bound to take longer than is necessary.

A further advantage of jig grinding is that ground holes give far better results than bored ones, and this, combined with the more uniform clearance between punch and die, results in cleaner stampings with longer runs between grinds.

Currently, a great deal of trouble is taken to evolve materials which have the least possible distortion when hardened. Sometimes other qualities are sacrificed to obtain this or a compromise is made. Jig grinding enables hardening distortion to be easily rectified so that the most suitable materials for a given purpose can be used without worrying about distortion.

Due to the fact that the work remains stationary, large and awkwardly shaped components can be ground far more conveniently than swinging them on a large internal grinder.

In addition to holes, slots and recesses can be ground in exact position taking advantage of the jig borer for accurate location. For this work the grinding head remains stationary with the grinding wheel only revolving. The work is then fed past the wheel by moving the machine table only.

Similarly, simple contours can be dealt with by using a combination of table movement and planetary rotation of the grinding head. For example, a slot with a radius at each end can be ground in this manner with the width of the slot and distance between radii being held to extremely close limits. Radial slots with a radius at each end can be ground in a similar manner with the help of a rotary table.

The jig grinder being used to grind insert slots on a large tool steel forming die.

Full advantage can be taken of the usual jig boring equipment such as tilting and rotating tables, division heads, etc., to grind holes at compound angles or between dead centers which would be almost impossible by any other method.

Jig grinding enables holes to be ground often after assembly. Thus built-up errors, possible when parts are finished individually, plus assembling distortion are eliminated and greater accuracy results.

The fitting of jig bushings is the accepted procedure in connection with jigs and fixtures. Frequently however close spacing is essential

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Locating and clamping sections for a large index fixture are mounted in place, then jig ground in relation to index locating points. Extreme accuracy is obtained by grinding all holes in the final assembly, while eliminating the time for accurate assembly of individual sections. Holes jig ground on this assembly are: 5 indexing station holes, 20 plunger pin holes, 20 locating pin holes, and 20 clamping stations.

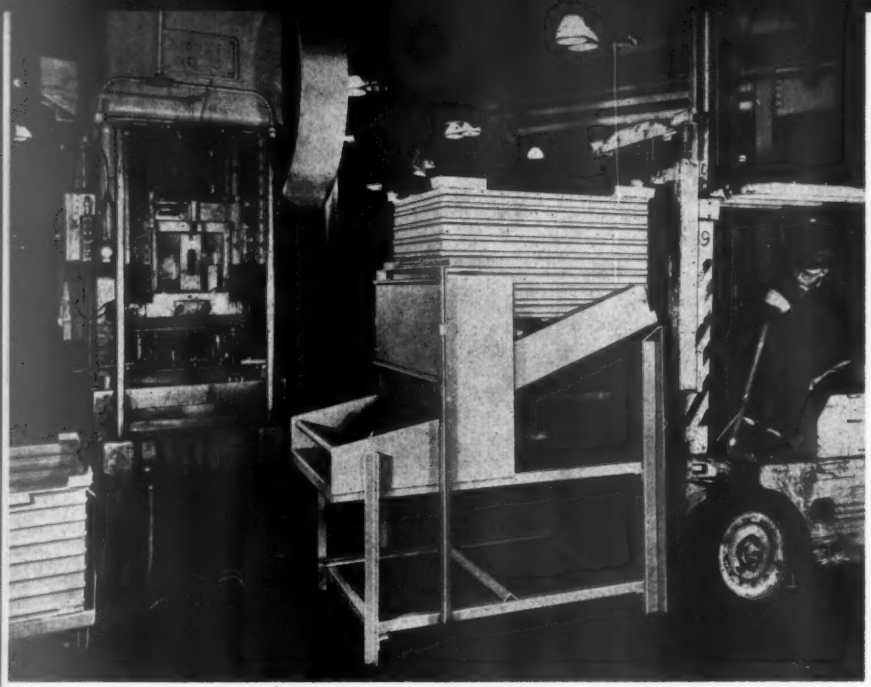

Fig. 1. As the fork-truck operator lowers the forks preparatory to backing away, the bottom of the Work-O-Matic box drops and allows the workpieces to flow into the work-level tray of the stand.

GAINING MAXIMUM PRESS PRODUCTION

with Modern Materials Handling . . .

PRODUCTION VOLUME on even the most modern metal-working presses is often limited by the inadequacies of make-shift materials handling. Frequently, manufacturers are denied the full capacity output of expensive equipment because of delays in supplying their press operators with blanks or in-process stampings, and because of improper positioning of material after it is delivered to the press operators.

Management of some plants has retained obsolete ways of material handling either because they are not familiar with modern methods, or because of apparent lack of floor space.

The experiences of one manufacturer of materials handling equipment convinced division engineers that cost reductions gained through work positioning would pay for necessary revisions in machinery layout within a short time.

The Union Metal Manufacturing Company of Canton, Ohio, is the parent company of several distinctly different plants. Separate Union Metal divisions make, in addition to materials handling equipment, street lighting standards, floodlight poles, and foundation pilings; gray iron castings; undercarriages for highway trailers; and parking meters. Each division operates under its own individual cost system and, like any plant, is guided by its own cost studies rather than by opportunities to use products of the other divisions.

The Street Lighting Division increased production of ten press operations an average of 37.4 per cent by providing machine operators with a continuous supply of parts at work-level position.

These gains were accomplished with 50 Work-O-Matic drop bottom boxes and ten Work-O-Matic positioning stands. Although this equipment is made by Union Metal's materials handling division, it was adopted by the Street Lighting Division only after production increases were established through bona-fide time and motion studies. These studies are shown in the accompanying table.

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A time and motion study showing production increases and cost decreases attained by more efficient workpiece handling and positioning.

TIME AND MOTION STUDY CONCLUSIONS—10 PRESS OPERATIONS BEFORE AND AFTER WORK-POSITIONING

Part	Operation	Hourly Production Before	Hourly Production After	Hourly Production Increase	Production Time Per 8-Hr. Shift Before	Production Time Per 8-Hr. Shift After	Production Per Shift Before	Production Per Shift After	Production Increase Per Man Per Shift
1. Simplex Shoe	Punch center hole (1 hit). Handle piece with tongs. Oil die 1 of 10 pieces.	585	709	21.2%	6 Hrs.	7 Hrs.	3510	4963	41.4%
2. Pole Plate	Punch key hole (1 hit). Handle piece with tongs. Oil die 1 of 20 pieces.	485	635	31.0%	6 Hrs.	7 Hrs.	2910	4445	52.8%
3. Simplex Shoe	Punch hole and countersink (1 hit). Handle piece with tongs. Oil die 1 of 10 pieces.	529	634	19.9%	6 Hrs.	7 Hrs.	3174	4438	39.8%
4. Strap (R.H.)	Form (1 hit). Handle piece with tongs.	769	900	17.0%	6 Hrs.	7 Hrs.	4614	6300	36.5%
5. Clamp	Form (1 hit). Handle piece with tongs.	600	652	8.7%	6 Hrs.	7 Hrs.	3600	4564	26.7%
6. Strap (R.H.)	Form (1 hit). Handle piece with tongs.	769	900	17.0%	6 Hrs.	7 Hrs.	4614	6300	36.5%
7. Strap (R.H.)	Punch slot (1 hit). Oil die 1 of 8 pieces.	811	891	9.9%	6 Hrs.	7 Hrs.	4866	6237	28.2%
8. Channel Leg (L.H.)	Notch (2) Corners (2) hits.	398	430	8.0%	6 Hrs.	7 Hrs.	2388	3010	26.0%
9. Washer	Flatten (1 hit). Sweep piece off die with wooden stick.	1046	1323	26.4%	6 Hrs.	7 Hrs.	6276	9261	47.5%
10. Crane Lug	Punch Large Hole (1 hit). Support end of piece during hit.	526	625	18.8%	6 Hrs.	7 Hrs.	3156	4375	38.6%

In each of these press operations, before work positioning, the operator had to turn away from his press, bend over into a skid box, and reach for his next piece. After work positioning, he had only to pick the piece from the work-level tray of the stand. In each operation, the combination of a continuous reservoir of parts, and elimination through work-positioning of time wasted in stooping and stretching for pieces, provided an extra hour of production time per eight-hour shift.

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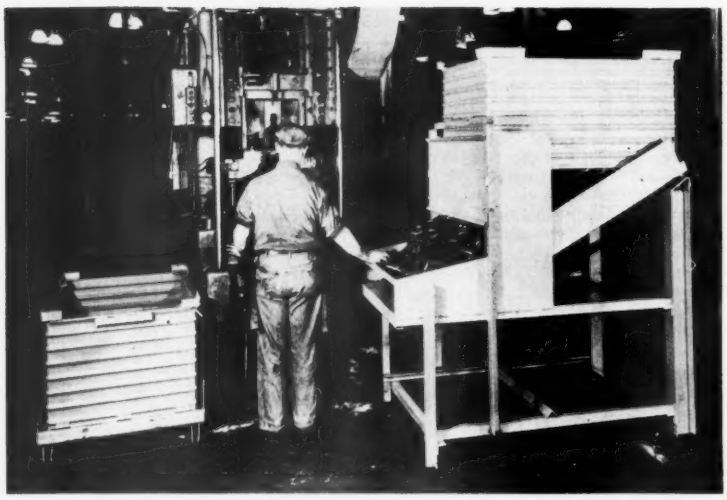


Fig. 2. The loaded Work-O-Matic stand insures the press operator of a generous supply of workpieces at comfortable arm's reach. This makes for a safe, fast, and efficient work rhythm.

Description of Equipment

The 12-gauge corrugated steel box has a one-piece, hinged drop-bottom made from a single sheet of quarter-inch steel plate, turned up at the sides to form a chute. Box volume is 20.2 cubic feet, enough to accommodate a 6,000 pound load.

The portable stand has a work-level tray which holds 25 per cent of the box contents, more than enough to provide the press operator with a continuous supply of parts while an empty box is replaced with a loaded one. The tray end is removable to speed job finish-off when, for example, there are still parts in the tray after a production run is finished. An adjustable, vertical control gate governs parts flow according to piece size. Front legs of the stand are recessed under the tray to permit close work-positioning.

Operation

A fork truck lifts the box to the desired height, then drives forward to set it on the stand (Figure 1). A front angle on the box engages a horizontal angle on the positioning rear legs of the stand. As the truck operator drops and withdraws the forks, the bottom drops, and parts flow into the stand's tray.

The press operator picks parts from the tray with one hand (Figure 2), while holding a piece in the press for the hit with his other hand. After the hit, he tosses the piece into a second Work-O-Matic box (same design box is used both to feed and receive parts). The lost motion of bending over into a conventional skid box and stretching for parts (Figure 3) has been eliminated by positioning parts at work-level height so the press operator can follow a fast,

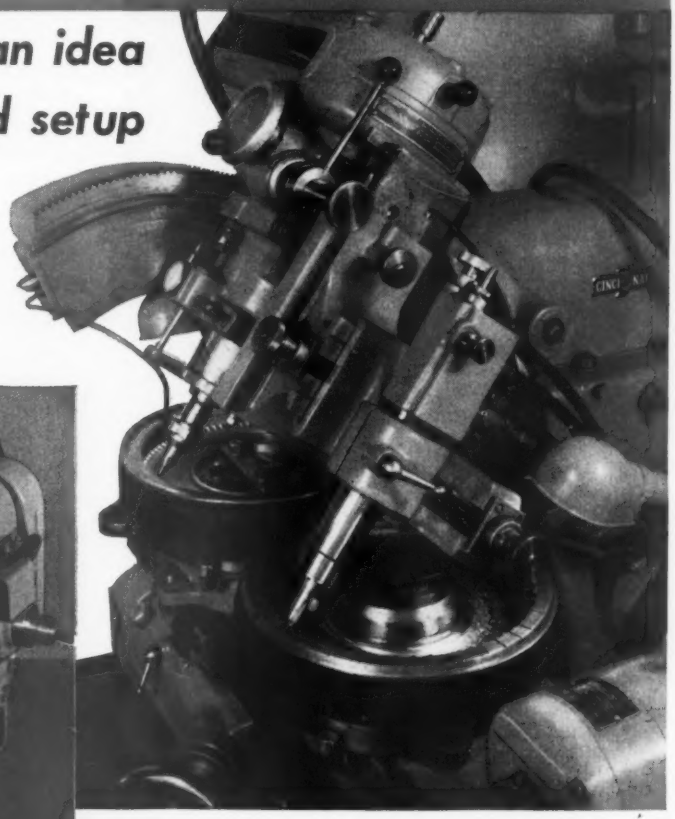
. . . Continued on page 64

Fig. 3. The Work-O-Matic installations at ten press operations in Union Metal Manufacturing Company's Street Lighting Division have obsoleted such back-breaking press loading exertions as this.

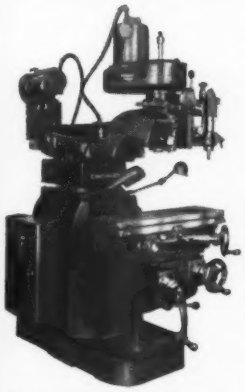
Ideas are where you find them

...and you may find an idea in this rubber mold setup

CINCINNATI



Milling the tread in a tire mold. The machine is a CINCINNATI 8" x 18" Tool and Die Miller, equipped with a power driven Duplex Rotary Table Attachment for completely automatic duplication of many complex shapes and intricate details with no more than casual attention from the operator.



CINCINNATI 8" x 18" Tool and Die Milling Machine. Brief specs. in Sweet's Machine Tool Catalog. Complete information in catalog No. M-1731.

Notice how the cutter spindle and tracing heads of this CINCINNATI 8"x18" Tool and Die Miller are swiveled to the most advantageous tracing and cutting position. The head can be swiveled right and left, forward and back, around a pivot approximately at the end of the cutter. Does this give you an idea? Notice the extra large cutting range evident from this setup; it's actually 8"x18" in one setting. Does this give you an idea? Notice the power driven Duplex Rotary Table Attachment; it rotates the master and work (mold) at the same speed under the cutter and tracing finger. Does this give you an idea? There are many exclusive advantages of the CINCINNATI 8"x18" Tool and Die Miller that you can translate into profitable ideas for producing dies and molds, and for contract toolroom milling. Brief data on these machines will be found in Sweet's Machine Tool Catalog; complete information may be obtained by writing for catalog No. M-1731.

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CINCINNATI

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Fig. 4. In the Union Metal cost studies it was found that the Work-O-Matic boxes reduced scrap loading cost 87.5 percent.

. . . Press Production, from page 62

efficient work rhythm. So too have delays caused by the press operator waiting for parts been eliminated — through the reservoir feature of the stand's tray.

Savings in Labor Costs

Using an average labor cost of $2.00 per hour — similar to that in any plant — direct labor costs at the ten presses would total $160.00 per eight hour shift. By using Work-O-Matics, Union Metal increased production at these ten operations an average of 37.4 per cent, without adding a single hour of direct labor. Thus, savings would equal 37.4 per cent of $160.00, or $59.84 per eight hour shift.

The company works one shift a day. In about three months sufficient savings were accrued to pay the cost of the new materials handling equipment. Of course, these savings of $59.84 per day continued to accrue after this three month period, totaling over $16,000 for the remainder of the year, and continuing thereafter. They could be distributed in dividends to stockholders, used to advantage in price reductions, and to increase production facilities.

Fig. 5. Compactness and practicality of Work-O-Matic boxes for in-process storage saved Union Metal the cost of building additional warehouse facilities.

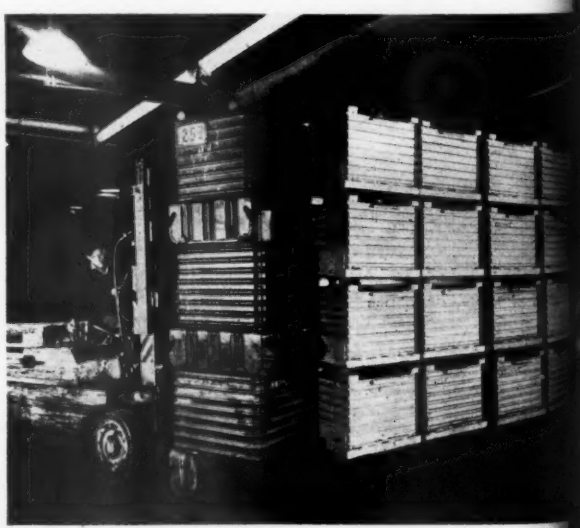
How about press operators and the union? No conflict was experienced in this respect; in fact, just the reverse. Press operators were relieved of the fatigue of stooping and stretching for parts, making their job easier. Further, they gained (as the time and motion studies show) an extra hour a day to work on standard, with the possibility of earning more bonus.

These savings determined by time and motion studies, reflect only reduced direct labor costs achieved through work-level positioning and from providing an uninterrupted supply of material to machine operators.

Other Savings

Actually, indirect savings were almost equally important. For example, controlled mechanical dumping (Figure 4) of the Work-O-Matic boxes reduced scrap loading cost 87.5 per cent. The work reservoir feature of the positioning stands eliminated the need for urgent expediting of material, and thus freed fork trucks of 15 per cent of the time previously required to service the ten work stations. Because the Work-O-Matic boxes can be more compactly stored than conventional containers, space required for in-process storage was reduced 33.3 per cent (Figure 5).

Modern, efficient materials handling certainly is no substitute for modern machine tools. Adequate handling equipment, however, represents a far smaller investment. Union Metal has found that a basic first step in any explorations to increase production or reduce production costs should be a careful analysis of materials handling methods. Such initial studies showed Union Metal inexpensive ways to save thousands of dollars in production costs.



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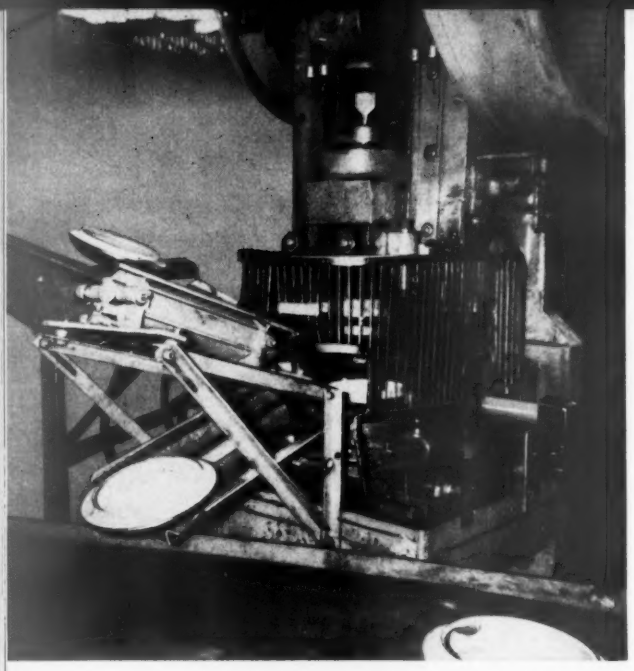


Fig. 4. Hub caps are fed into this press from the top of the inclined belt conveyor, shown at the upper left. As the hub cap drops into the die, the beam of an electric-eye control, shown at the right, is broken causing the press to operate.

. . . Safety Hazards, from page 55

to 30 pcs/min. Also available is a new, portable type automatic unloader capable of removing parts at the rate of 35 pcs/min.

In operation, the Iron Hand moves into the die and grips the part at the moment the ram rises sufficiently to permit removal of the part. It lifts the part out of the die and swings back, placing the part on a table or conveyor. The Iron Hand then returns to its original position awaiting the next part.

The following study resulted in the decision to install three Iron Hands on a press line for bumper guards.

The press operations (which remained unchanged as a result of the use of Iron Hands) are performed in the following order:

1. Draw—300-ton toggle type press
2. Brehm trim—290-ton single action press
3. Cut-apart—75-ton press.

In the draw operation, the operator uses pliers to place an oblong shaped blank, 0.072″ thick x 12 1/2″ x 24 1/2″ onto the draw die. He then depresses two press operating buttons which he must hold until the die is completely closed. When the press cycle is complete, the operator removes the piece with pliers and places it on a table to his left.

As a safety measure, the operator is not allowed to remove the piece until the press ram and blank holder movement have come to a complete stop. This safety precaution is taken to protect the operator in case of electrical or mechanical failure which would allow the press to repeat.

Use of an Iron Hand improves safety by eliminating any need for movements in and out of the die by the worker. The Iron Hand also eliminates the time allowed for the operator to remove parts since it can move in and remove the piece as the press begins to open. Saving the time allowed for an operator to remove the piece, in this example, results in an increase in hourly production on the draw operation.

In the Brehm trim operation, the same amount of time is saved and a similar increase per hour made. The important safety feature in both instances is that the operator's hands (with pliers) are not being used for parts removal.

A comparison of the two methods showed that in achieving this improved safety, the expected increases in production and the reduction in overall manufacturing cost for these operations would pay for the equipment.

Conveyor Feed and Automatic Removal

A method of feeding parts into a punch press from a belt conveyor was recently adopted on a clinching operation for a hub cap assembly as illustrated in Figure 4. To make the operation completely automatic, removal from the press is accomplished by means of an air-operated piston with hook attached. This device is attached to the front of the punch press, and is operated by a limit switch and solenoid valve.

Previous to the addition of automatic equipment, the sequence of operations was as follows:

Operator No. 1

1. Remove hub cap body from bin
2. Remove hub cap cover from conveyor line
3. Place cover over body and put assembly back on conveyor line

Operator No. 2

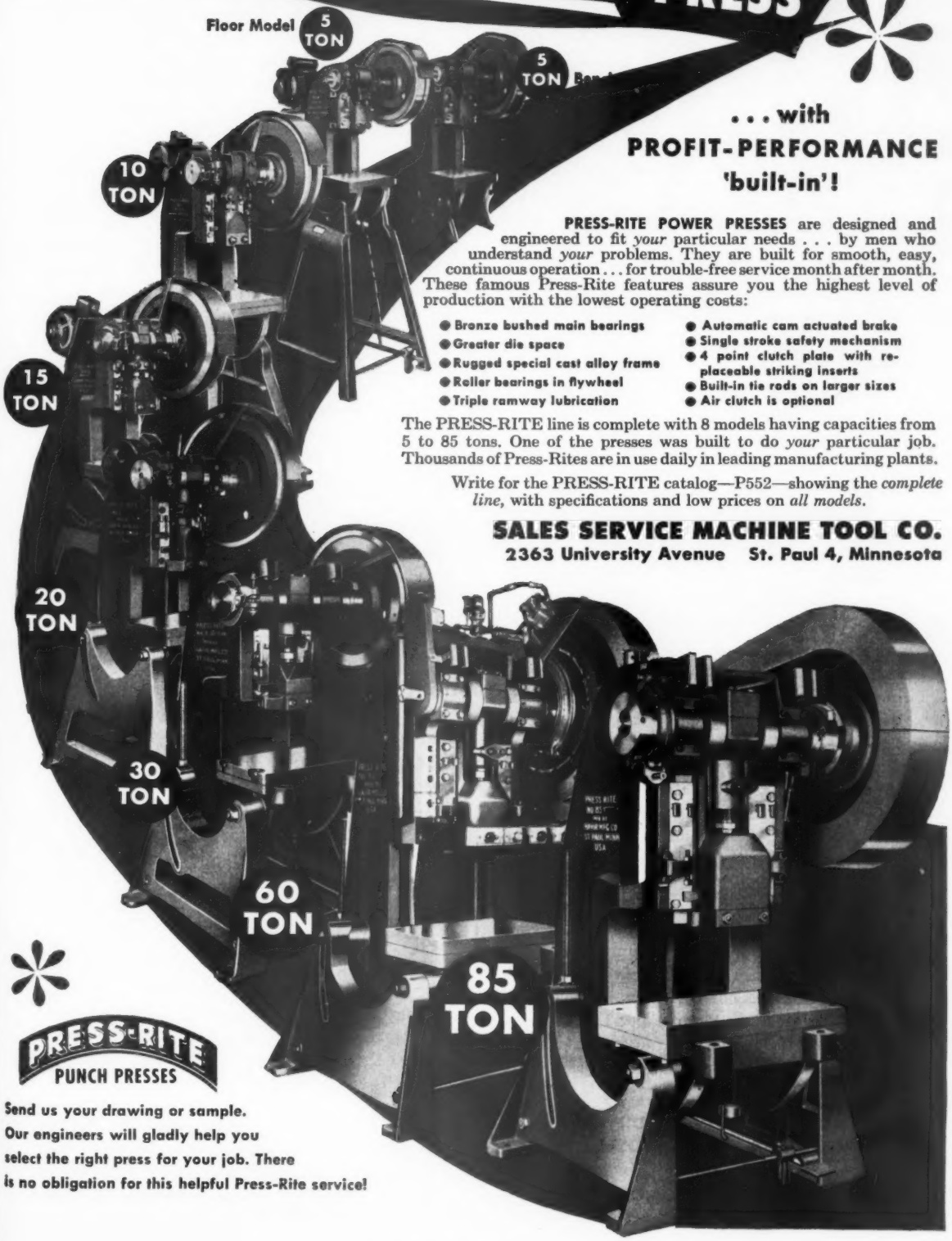
1. Remove cover and body from conveyor line and place on gravity slide feed
2. Remove completed assembly from punch press and place on conveyor line.

The punch press in this case was equipped with an electric-eye which caused the press to operate when a part slid down the gravity chute and into the die.

With the addition of automatic equipment to this operation, the sequence becomes:

. . . Continued on page 68

SELECT THE RIGHT PRESS



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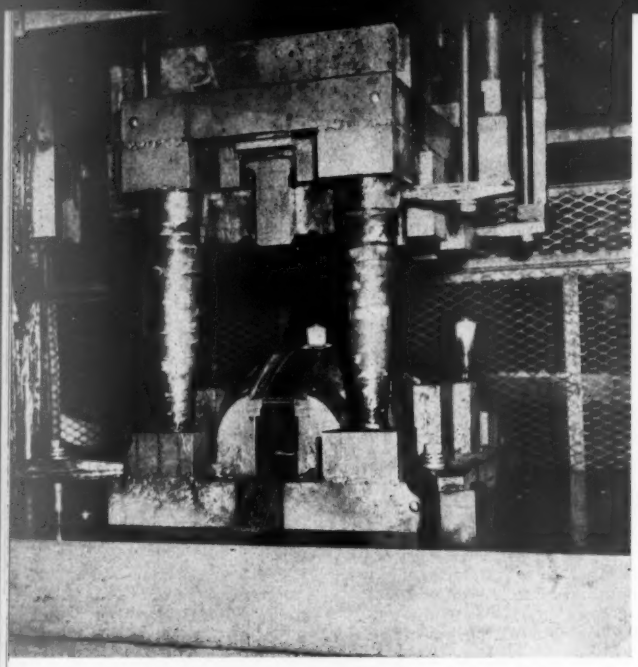

Fig. 5. Telescoping coil of metal protects against injury from guide posts.

. . . Safety Hazards, from page 66

1. Remove hub cap body from bin
2. Remove hub cap cover from conveyor line
3. Place cover over body and place assembly on inclined belt conveyor feeding punch press.

The operation, from this point forward, is automatic.

The cover and body assembly drops from the inclined belt conveyor onto a gravity chute which guides the assembly into location on the clinch die. Upon reaching the proper location on the clinch die, the assembly breaks the electric-eye beam which causes the punch press to operate.

After the clinch operation is completed, a cam on the crankshaft of the punch press trips a limit switch which controls the air-operated removal device. The hook at the end of the rod on the air cylinder pulls the completed hub cap assembly out of the die and onto another gravity chute. In sliding down this chute, the hub cap assembly passes over another limit switch before dropping onto a conveyor line which takes the hub cap assembly to the packers. The press will not begin a new cycle until this limit switch has been tripped by an outgoing completed assembly, the purpose being to protect the die against damage due to "doubles."

STANDARDIZATION OF DIE DESIGN FOR SAFETY PURPOSES

Many safety features can be included in the design of dies for punch presses. Typical examples are scrap cutters, guide post guards, kickers, drop-through dies, and pick-offs.

Scrap Cutters

In blanking operations and in large trim operations, there is metal left that is no longer a part of the piece being manufactured. The metal that is left has sharp edges or prongs which can cause serious lacerations to an operator. To make this metal safer to handle, it is usually cut into small pieces.

In blanking operations where a skeleton is coming out of the die, scrap cutters can be attached to the outgoing end of the die. The scrap cutters act as shears, and, with each stroke of the press, they cut off whatever metal comes out of the die. The scrap that is cut off is directed into a scrap tub or onto a scrap conveyor. In this way, it is not necessary for the operator to handle the scrap.

Guide Post Guards

Most dies require guide posts and bushings. The guide posts are mounted on one half of the die, and they enter bushings located in the other half of the die as the ram descends. When the press is in the open position, the guide post is out of the guide post bushing. This situation presents the danger of an injury should an operator place his hand over either the guide post or the guide post bushing when the die closes.

One method of safeguarding this hazard is to use guide post guards as shown in Figure 5. Another method uses guide post extensions so that the guide post does not come out of the guide post bushing. The types of guide post guards include telescoping and spring type guards.

Kickers

A recent development of the Fisher Body Division, General Motors Corporation, is a gadget known as a kicker. The kicker, or parts ejector, is merely an air cylinder which locates on or in the die. It is actuated by the up-stroke of the press and kicks the completed part from the die.

Drop-Through Dies

Drop-through dies for blanking operations are particularly advantageous for easy and safe parts removal. Since the blank drops straight through the die, a conveyor, chute, or stacker is easily adapted to the operation.

Pick-Offs

When a formed part remains on the die, an operator might place his hands in danger trying to remove the part from the die. If a pick-

. . . Continued on page 176

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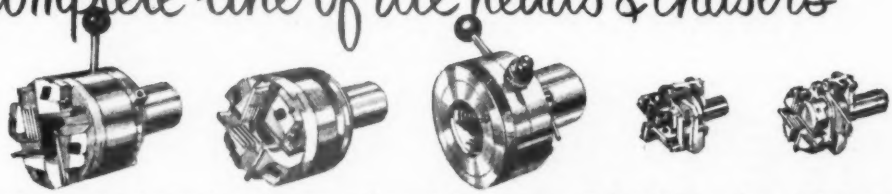

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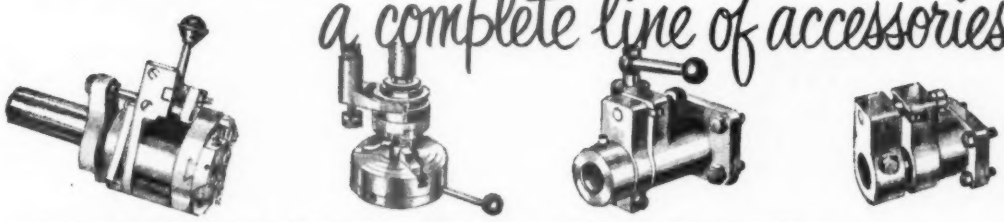

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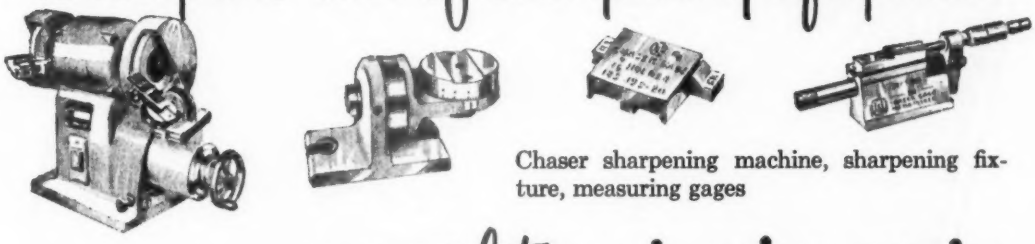

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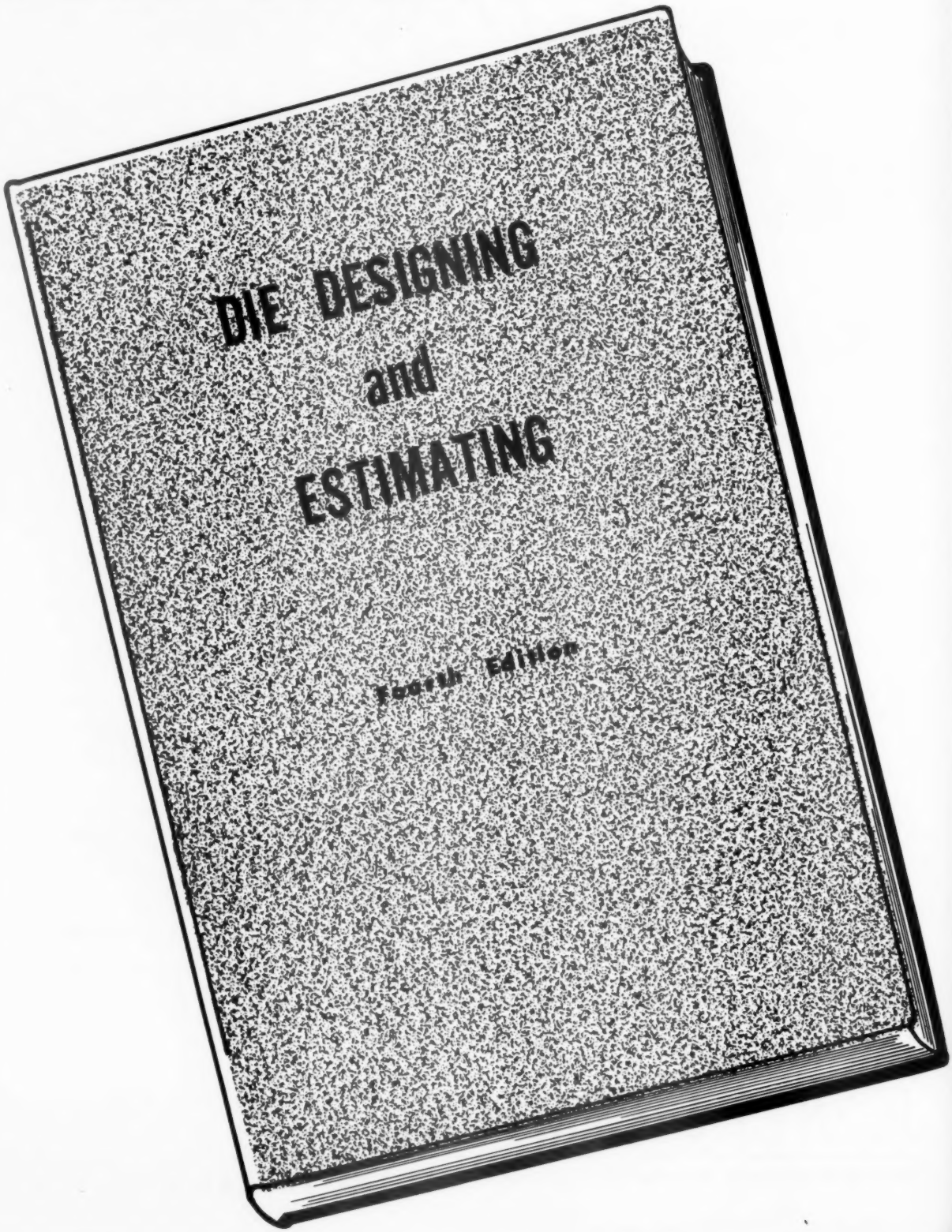

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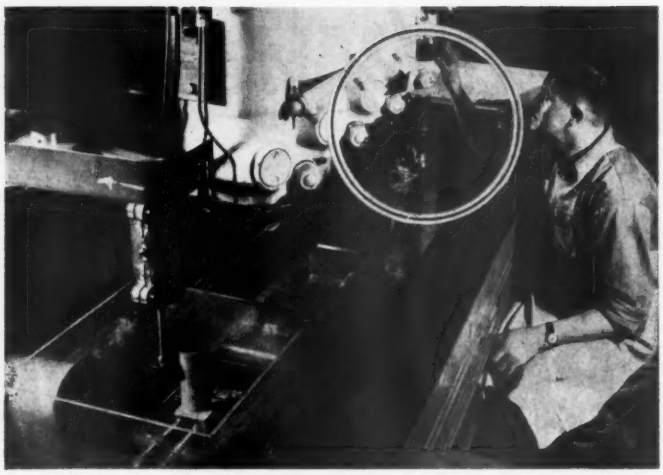


The adoption of tungsten-carbide for spindle and bearings of a high speed assembly used to support the diamond grinding wheel in a Hydrotel duplicating machine has proved highly effective in the NACA research laboratory in Cleveland, Ohio. The housing for the carbide spindle and bearings are shown in the upper part of the encircled area. The arrow points to the diamond grinding wheel at work.

CARBIDE SPINDLES AND BEARINGS FOR *NACA* PRECISION GRINDING

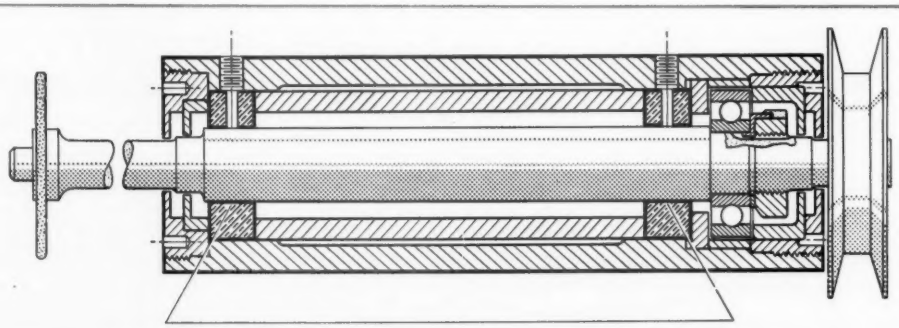
IN THE PAST SEVERAL YEARS, the demand for higher temperature turbine rotor and stator blades for use in research has been steadily rising. These blades of necessity are made from hard, brittle materials which are new to this field and for which fabrication techniques do not exist. This has posed many problems in producing these blades for the vitally necessary research work on higher temperature operation for jet engines.

The National Advisory Committee for Aeronautics, Lewis Flight Propulsion Laboratory at Cleveland, Ohio, has been developing means for producing high-temperature turbine blades for research. In one process, recently developed, NACA has had unusual success. This process involves finish grinding the blade profile and the success is due to the adoption of tungsten-carbide for spindle and bearings of a high-speed assembly used to support the diamond grinding wheel as shown in the accompanying photograph. It is felt that this technique could be applied to many other precision grinding operations.

The main difficulty encountered was lateral vibration (of a very small, minute nature) of the grinding wheel, which led to excessive wheel wear and blade breakage. The first grinding was attempted with sintered-type abrasive wheels on a ball-bearing-mounted spindle. This abrasive broke down so fast that no accuracy could be maintained.

The first correction tried was the use of diamond wheels with a plastic matrix mounted on the same ball-bearing-mounted spindle.

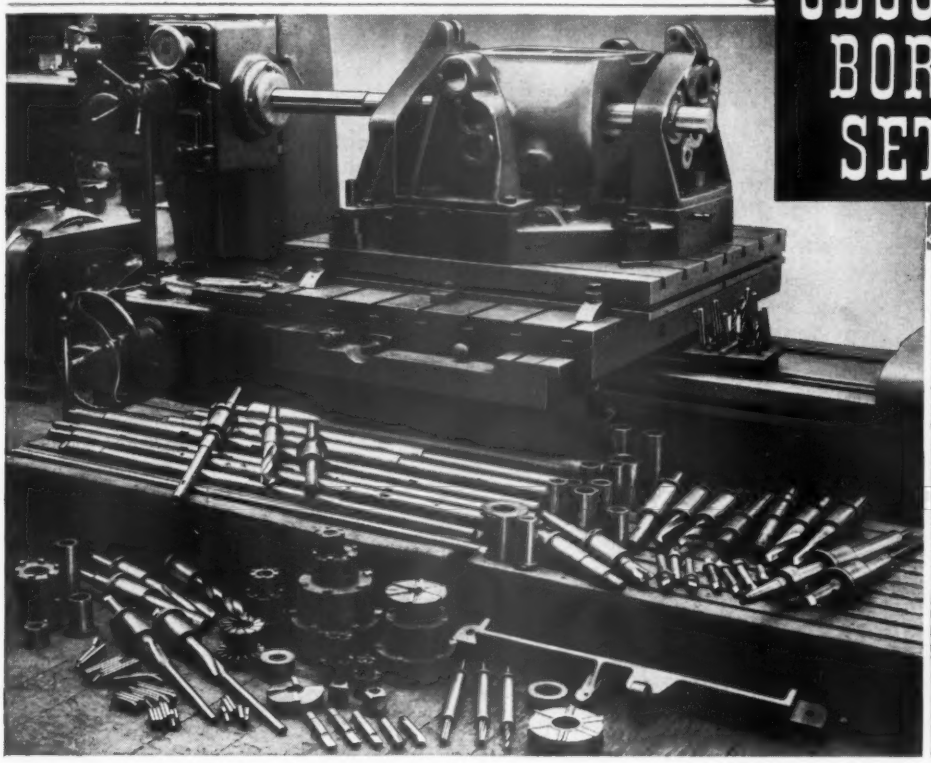
. . . *Continued on page 181*



0.0002" to 0.0003" Diametrical clearance between tungsten-carbide shaft and bearing.

Here is a picture of an...

OBSOLETE BORING SETUP!



THIS PICTURE— taken in a well known machine tool plant illustrates the old method of boring turret lathe headstocks with a costly inflexible box jig and a mass of special tooling

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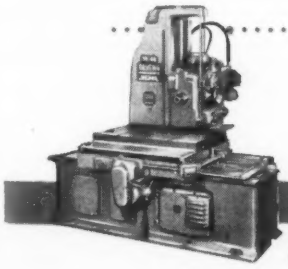

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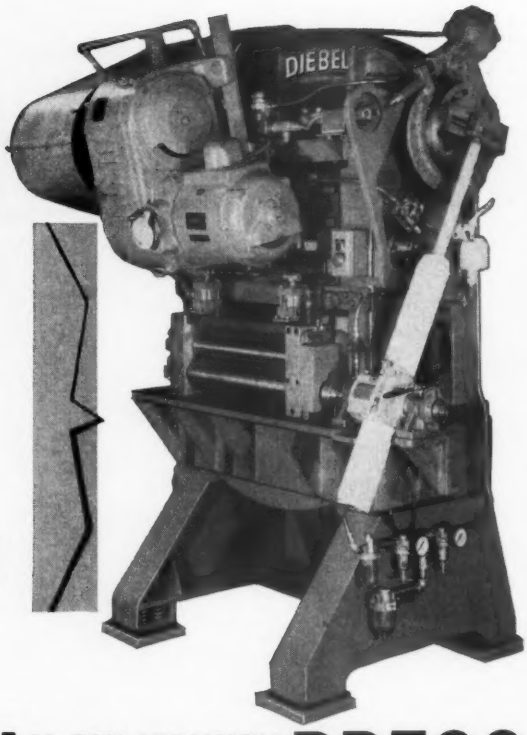

DIEBEL 40 TON AUTOMATIC Back To Front Feed PRESS

Manufacturers of parts involving wide and relatively light stock have been faced with the problem of buying a big tonnage press to get the needed bed area and feed width. This has been unsatisfactory not only because of higher initial investment, but the direct and indirect costs of maintenance, power and slow rate of speed.

Di Machine has designed a press to meet the specific needs of these manufacturers.

The 40 Ton Diebel Automatic Press with back-to-front feed has proved to be the most economical method of mass producing wide, light stampings.

Stock up to 23" wide with a length of feed from 0 to 13" can be mass produced from 72 to 360 strokes per minute on the 40 Ton Diebel Automatic Press.

DIEBEL HI-PRODUCTION AUTOMATIC PRESSES

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New Tool, Work Holding Chuck Has Many Uses

The Model 96 collet chuck is a brand new tool holding and work holding chuck which now permits the use of Rubber-Flex collets on many different machine tools throughout your shop.

It provides outstanding collet performance on grinders, milling machines, jig borers, jig grinders, lathes and various types of special machinery where a precise compact collet closure is desirable.

The collet chuck is made in two models whose only difference is in their back mounts. Model 96-05 is equipped with a No. 5 taper back mount while Model 96-F1 has a flange mount. Both have a one-piece hardened steel body. A conical bore in the front of the body accurately centralizes the Rubber-Flex collets. Mounted on the body by means of a deep-groove ball bearing is a hardened steel geared sleeve having a ground threaded bore which is threadedly engaged with the collet closing nose of the chuck. This nose is made of a hardened steel and all working surfaces, including the threads, are ground. Rotation of the chuck sleeve for initial engagement of the part to be held is accomplished by hand rotation of the sleeve. Final locking is effected by clockwise rotation of a geared key supplied with the chuck.

Photo courtesy Jacobs Mfg. Co.

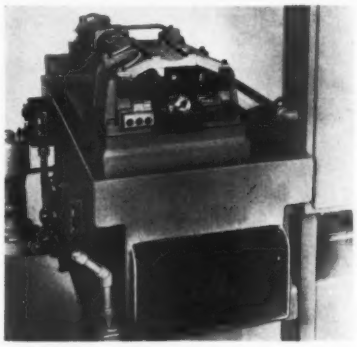
Model 96-F1 collet chuck is shown holding work on a surface grinder using a magnetic chuck.

The chuck is normally used for gripping bright finished metal bars; but because the Rubber-Flex collets used in the chuck

have an unusual range of capacity, it is also adapted to hold resilient and compressible materials, such as rubber, plastic and wood. A further use is the gripping of delicate cylindrical pieces, such as thin-walled tubing of metals, wood, or plastics, and brittle materials such as ceramics and glass.

480 Bearing Cap Faces Per Hour

High speed broaching of the locating faces on automotive bearing caps is being accomplished on a special-built horizontal broaching machine. Parts are being broached at the rate of



Photos courtesy Colonial Broach Co.

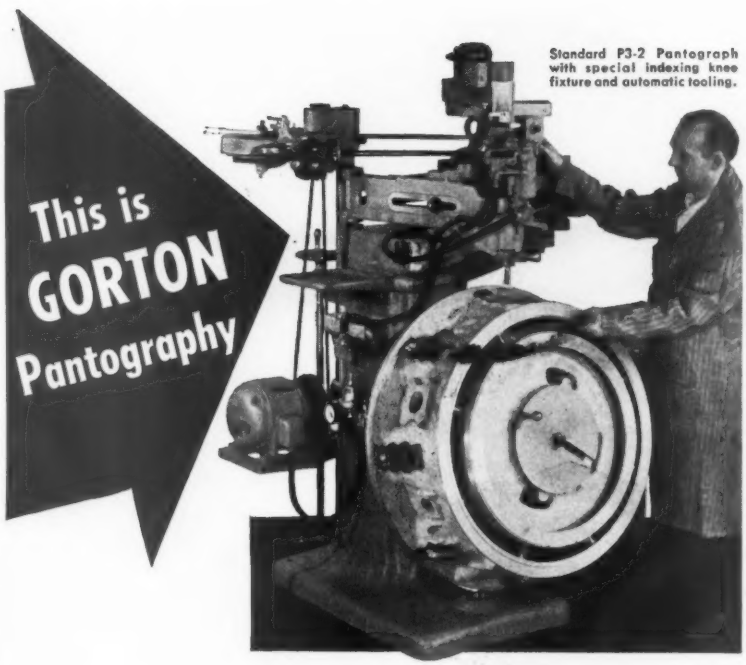
Fig. 1. Locating faces on automotive bearing caps are broached at the rate of 480 per hour on this Colonial. Two stationary insert-type broaches, both of which are adjustable, remove 0.0045 in. of stock with each cutting pass. Note the special fixture that guides the cap as it is pushed through the stroke. Fixture may be inverted for broaching different size caps.

480 per hour with this semi-automatic unit which features two adjustable stationary insert-type broaches.

Fig. 2. These locating faces on the two outside caps have been broached on a special built horizontal broaching machine while the center part is unfinished.

It is a 4-ton machine having a 12-inch broaching stroke traveling at the rate of 30 fpm with maximum return speed of 60 fpm. The fixture design for this machine is interesting, in that it does not clamp the part — but

. . . *Continued on page 86*



Standard P3-2 Pantograph with special indexing knee fixture and automatic tooling.

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Photo shows a standard P3-2 profiling ports in an aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic. A combination of other methods would do the cutting in hours, but the P3-2, with an automatic cutting cycle, finishes each port in 2.3 minutes.

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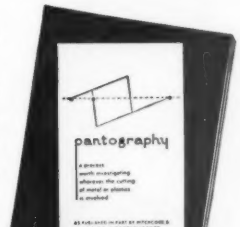

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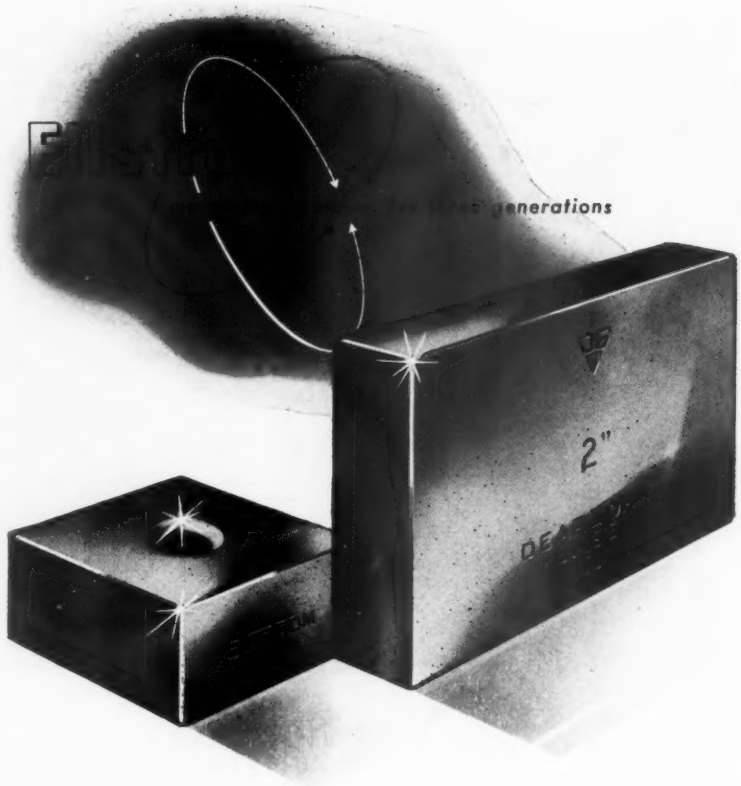

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•

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•

June 9-11. American Society for Quality Control. 8th Annual Convention. Kiel Auditorium, St. Louis.

•

June 13-18. American Society for Testing Materials. Annual Meeting. Sherman Hotel, Chicago.

•

June 15-25. Conference on Machine Tool Technology. Massachusetts Institute of Technology. Cambridge, Mass.

•

June 16-18. High Vacuum Symposium, Committee on Vacuum Techniques. Berkeley Cartaret Hotel, Asbury Park, N. J.

•

July 12. National Machine Tool Builders' Ass'n. Machine Tool Sales Conference. Cornell University, Ithaca, N. Y.

•

July 13. National Federation of Metal Finishers. 2nd Management Seminar. Statler Hotel, New York City.

•

July 13-15. Western Plant Maintenance Show. Pan Pacific Auditorium, Los Angeles.

•

Aug. 23-Sept. 3. Automatic Control of Machine Tools. Summer Program. Massachusetts Institute of Technology. Cambridge, Mass.

•

Sept. 13-16. Society of Automotive Engineers. Tractor Meeting and Production Forum. Hotel Schroeder, Milwaukee.

•

Sept. 13-24. Instrument Society of America. First International Instrument Congress and Exposition. Commercial Museum and Auditorium, Philadelphia.

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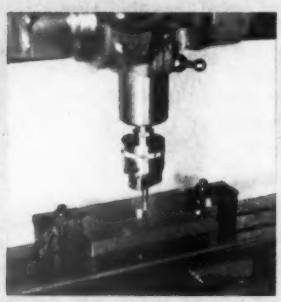

▲ On this operation DEKA BORE saved 80% of the time previously spent on the same job. DEKA BORE is shown being used here on a vertical milling machine.

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Body diameter	2¾"
Body length	3⅝"
Bar or tool capacity	½"
Tool Block slide	1⅛"W x 2⅝"L
Maximum Offset	½"
Bar or tool grip	1⅜"
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Fig. 1. Here is how material handling is minimized by using a Bath press-type brake at the Metal Products Co. The helper on the right passes the workpiece to the operator of the third die from the left where the part is drawn. It is then placed on the table for the operator on the extreme left at whose die the Play-Pool seat gets a re-strike. After the piece has been re-struck, it is picked up by an operator stationed in back of the press (see Figure 3.).

In-Line Technique Applied to Press Brake Production

TO MINIMIZE MATERIAL HANDLING and eliminate inter-operational time lag and consequent age hardening losses, the Metal Products Company of Niles, Ohio, found a way of utilizing a Bath 150-ton press-type brake to perform four instantaneous production line operations in the manufacture of children's Play-Pool seats.

In this particular project, the seats act as corner caps for an assembly consisting of a leg with tubular braces at each corner. The Metal Products Company also makes these corner legs.

Figure 1 illustrates the general job set-up in which four operators and one helper are employed. Two operators work at the front of the machine and two at the rear.

Figure 2 shows the arrangement of the dies, the production stages and the finished product.

Figure 3 was taken from the rear of the brake where operations three and four are performed.

The workpieces are 24 gauge steel and are drawn in the third die from the left facing the front of the press as seen in Figure 1.

The next operation, by the die on the extreme left, is a restrike.

The third, using the second die from the left, is a trim, and then the die on the extreme right finishes the form so that there is a return flange all the way around the outside of the part.

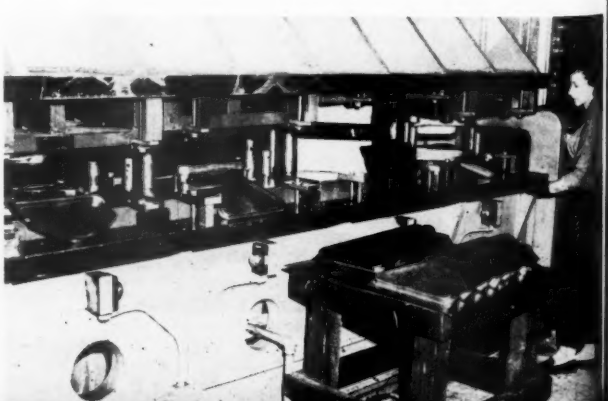
The final operation consists of merely piercing four holes in the sides of the assembly.

It was Metal Products experience that press work in light gauge metals, where there is excessive drawing, usually resulted in a condition of age hardening. This presented a real problem since the brittle condition of the metal caused breakage losses to jump to as much as 30%. In order to offset this, it was necessary to complete immediately all operations on this part and to cut handling time to a minimum.

Further, they have found that with the Bath

. . . *Continued on page 82*

Fig. 2. The arrangement of the dies and the four stages of production are shown. This is a front view of the press. Note the four buttons under the work table. They must be pushed simultaneously with four similar buttons at the rear of the press before the machine will operate. Thus, the four operators must have all hands on the buttons to put the press in action. This has assured the company of 100 percent injury-free operations.



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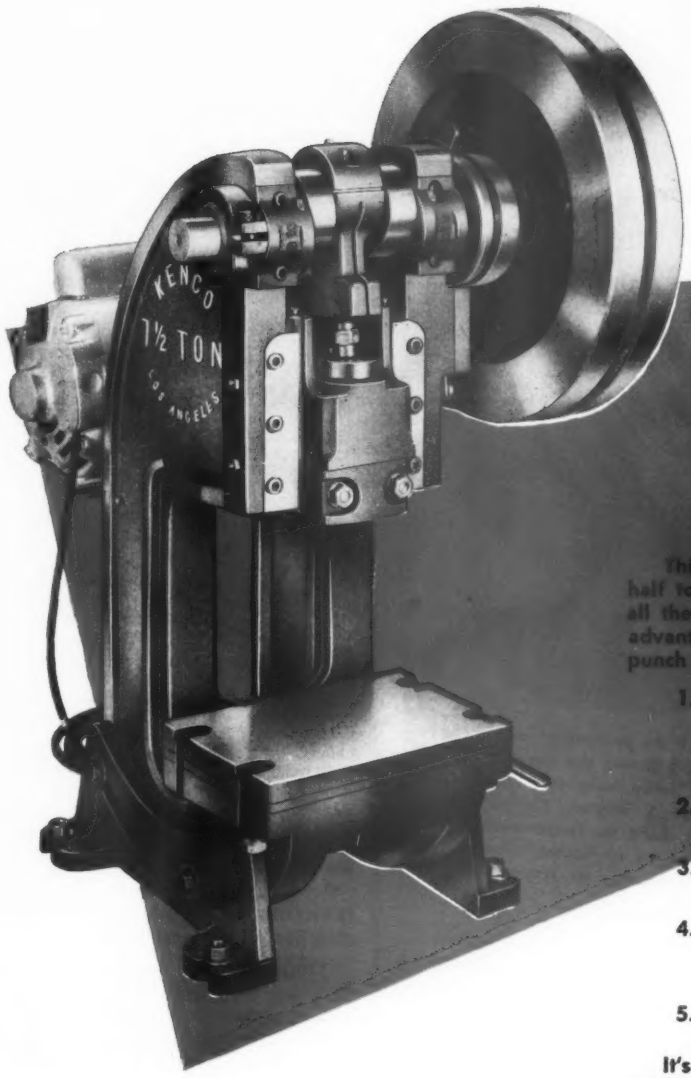

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Automatic Loaders Speed Output of Broaching Machines

A new line of Red Ring automatic loaders, designed to speed output of externally broached round parts on conventional dual ram vertical broaching machines, is announced by a Detroit Broach and Machine Company.

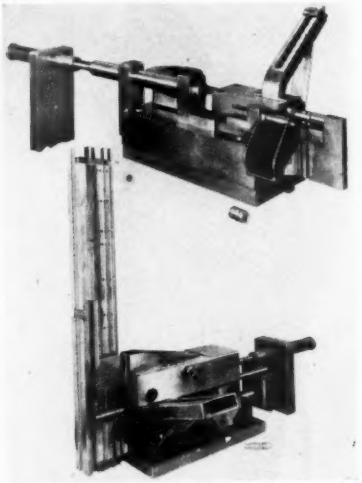

Photo courtesy National Broach & Machinery Co.

Fig. 1. New Red Ring automatic loaders for handling externally broached round parts on dual ram surface broaching machines. Two models are shown here. The loader at the top handles 1.300" long, 1.0" dia. steel hydraulic valve sleeve. The loader at the bottom (shown with broach holder assembly) handles 3.840" long, 1.0" dia. hydraulic valve sleeves.

These loaders, which are made in a wide variety of types to accommodate specific parts, feature magazine feeds and simple, compact feed, clamp and eject mechanisms. No auxiliary power source is required to actuate the loader mechanisms since the in-and-out travel of the dual ram broaching machine tables is utilized to impart motion to the loader feed and clamp components.

Round parts such as valve spools, universal joint needle bearing cups and similar parts on which flats or slots can be surface broached are ideally adapted to Red Ring automatic loader applications. Output of the loaders is limited only by the speed of the machine. An operator keeps the feed magazine full and

the finished parts are automatically ejected into trays.

Loader Description

Basically the loaders consist of a fabricated steel base that supports the magazine feed chute, feed and clamping mechanism, and unloading chute. This unit is mounted on one of the dual ram machine tables. A plate that actuates the loader through control rods is bolted to the front of the broaching machine base.

The one or more surface broaches used in conjunction with the automatic loading devices are mounted on a broach holder, (bottom figure in illustration), that is keyed and bolted to one of the machine rams. This holder design permits the broaches to be mounted at right angles to the ram surface, thus enabling the parts to be fed and ejected at the side of the machine with the loaders moving in and out with the machine table.

The magazine feeds are designed in such a manner that parts will not enter the loaders in incorrect endwise location for broaching.

Loader Operation

The loader at the top of the illustration, (cover removed), broaches flats in three grooves in a 1.300" long, 1.0" dia. hydraulic valve sleeve. When a part gripped in the loader clamp jaws has been finish broached, the loader retracts with the table.

This motion toward the front of the machine causes a clamping cam to rotate out of position behind the clamp jaws. This cam is controlled by a rack and pinion mechanism through the upper rod fastened to the loader control plate that is bolted to the front of the machine base.

The clamp jaws are then retracted by another control rod attached to the loader control plate. During jaw retraction the part is pushed off the jaws into the unloading chute by spring-loaded fingers.

With the loader fully retracted, a part enters the clamp jaws from the magazine feed. As the loader approaches the broaches on the return stroke, the part is advanced to clamping position past the fingers by the lower control rod. It is then securely clamped in position for broaching near the end of the table

. . . Continued on page 84

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CIRCLE INFORM-A-GRAM KEY NO. 81

. . . Press Brake, from page 78

press-type brake they have been able to outproduce any conventional type of press work on their individual presses by at least two to one, including loss due to scrap.

The company has utilized this machine to its full capacity, both in operations performed and number and weight of dies.

With the controls as set up, the job has been run at full capacity with no injuries whatsoever since installation of the machine.

To elaborate on the safety precautions taken in this operation, there are eight hand buttons installed, two for each operator, and the machine does not strike until all eight buttons are pressed. Hence the 100% safety record.

The company is considering adapting another job for the machine as it has run into a similar condition of age hardening of some parts which require nine operations to finish. It is experiencing as much as 50% breakage on this job and officials feel that they can cut the breakage down to 5% by using the continuous in-line techniques developed on the Play-Pool parts.

The machine used has a bed 10 feet 9 inches left to right, and 30 inches front to back. Shut height is 14 inches and there is a 5 inch stroke operating at 45 per minute.

The ram, whose action is finely controlled in its housing, is equal to the bed in area, and it is, of course, this abnormally large bed area which makes possible the efficient and economical production schedule achieved by Metal Products. Such bed dimensions are usually only met in slower straight side presses and, if installed for this job, would have more than doubled the company's capital expenditure.

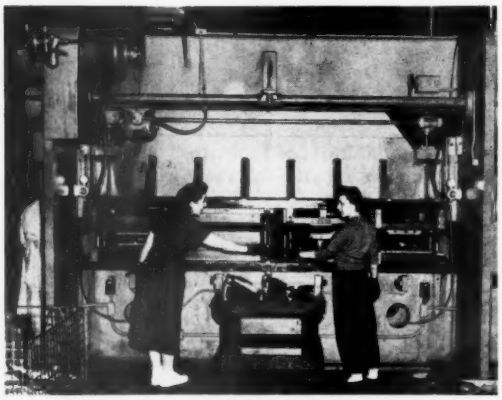

Fig. 3. This shows the rear of the Bath press where work on the Play-Pool seat is completed. The third operator, using the second die from the left, trims the piece. The workpiece is then passed to the operator on the right who finishes the job on the extreme right die. This step leaves a return flange around the outer part of the seat. A final operation consists of piercing four holes in the sides of the piece.

The apparent advantages realized by Metal Products in employing the Bath brake are the saving in initial outlay; retaining of facilities usually found in slower straight side presses; the production of the desired part with uniform accuracy; the doubling of the output they previously achieved with individual O.B.I. presses; and, the savings in electrical power and maintenance.

Slitting Machines Allow In-Plant Strip Production

Low cost, compact slitting machines just developed may result in more widespread in-plant slitting of all types of coils and sheet metal. By the use of standardized interchangeable parts, a series of "tailored" slitting units have been designed to meet a wide variety of manufacturing needs.

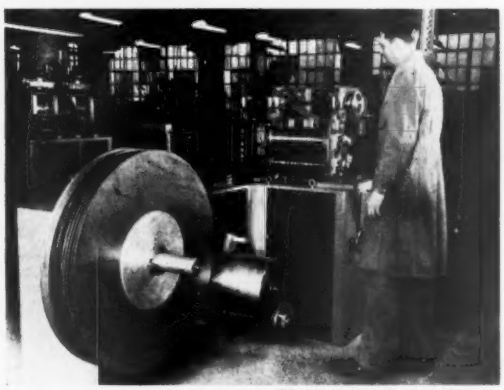

Photo courtesy of Stanat Mfg. Co.

Model S-180 slitters in operation, showing use of recoiler and scrap winder.

The slitting line constitutes a new concept in the field of metal slitting. By winding the slit coils on core plates, expensive pushoff mechanisms may be eliminated. Cost has been further reduced by unit-mounting the recoiler on the slitter base, yet at a sufficient distance from the cutters to minimize the camber effect of "fan-out".

The slitters are designed with special attention to ease of setup and operation. Through use of a double set of bearings, in addition to outboard bearings, arbors remain parallel and in position when the outboard housing is removed for cutter changeover. This makes it possible to replace the outboard housing without using a crowbar or other means to lift the arbor into position. By use of an optional worm gear type screwdown arrangement, cutter overlap is carefully controlled, since arbor parallelism is not disturbed by any change in setting. Maintenance of the slitters is particularly simple since all parts are easily accessible.

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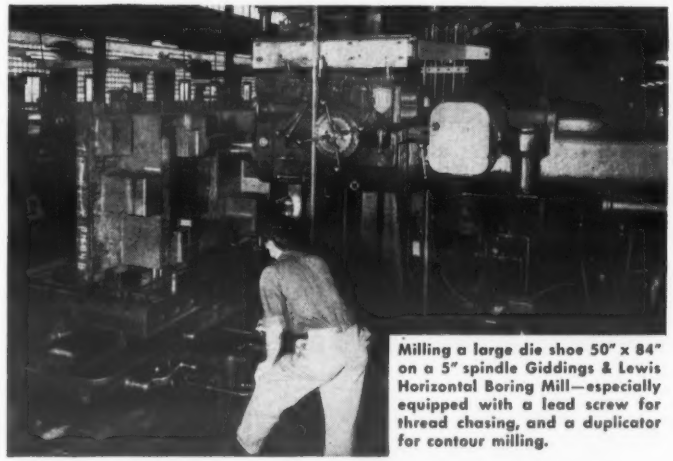

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. . . Broaching, from page 81

travel by the clamping cam, which is rotated into position behind the clamp jaws by the upper control rod. Clamping pressure is controlled by a spring on the end of the rod.

The unloading chute is swung out of interference with the broaching operation by the ram.

On a setup of this type an automatic loader can be mounted on each machine table and a part produced with each ram stroke. It is also possible to mount loaders handling different parts on each table and broach two different parts on alternate ram strokes on a single broaching machine.

The loader at the bottom of the illustration unloads a part at the same side it is loaded. It includes a split plunger type chuck that retracts the part to a position in front of the unloading chute behind the magazine feed.

The design in this particular loader includes an auxiliary roller wedge clamping mechanism.

Loader Specifications

Red Ring automatic loaders for dual ram surface broaching machines are designed to suit specific part and machine requirements. The loaders illustrated are about 10″ high x 20″ long. They weigh approximately 300 pounds.

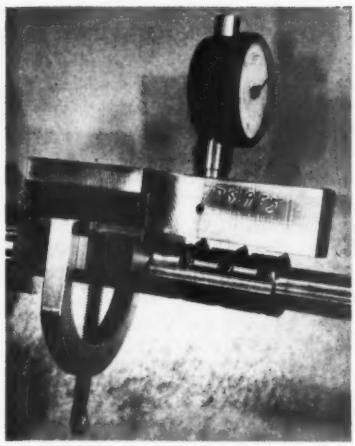
UNIQUE BORING CUTTER GAGE

Adjustment of boring machine cutters at TEMCO Aircraft Corporation has been speeded and simplified by means of a unique gage that a first-day employee can operate.

TEMCO's gage allows cutters to be set to within .0001″ of desired position in a few minutes time.

It is constructed to adjust cutters to only one setting, and is used only in cases where bore radius is constant for a large volume of work.

Need for a gage of this type was noticed by operators of an Ex-Cell-O boring machine used to bore a standard hole in a large number of castings. Boring cycle required only 14 minutes, but it sometimes took operators the same amount of time between cycles to mike-check the adjust-



ment of the three cutters on the bore rod.

Micrometers also caused occasional damage to brittle carbide tips on the cutters, and their accuracy depended, to some extent, on the user's experience.

Precision Bench Mechanic T. J. Kittrell sketched an idea that resulted in the gage now in use.

It is a combination step-dial indicator gage, mounted on a small V-block. A V-block clamp fits in slots on the block's sides and secures the entire 4½"-by-1¾" tool steel device on the bore rod.

The stepped part of the gage overhangs the cutters when the gage is secured on the bore rod. Each of the gage's three steps is cut so it marks the desired radius of sweep for its respective cutter. Cutters are adjusted by set screws so their tips touch the steps.

For the third-cutter — the one that makes the last, deepest and most exacting cut — a .0005" dial indicator gage is used to provide extreme accuracy.

The indicator is mounted on top of the step gage. It is actuated by a plunger which the cutter tip touches when it is flush against its step. TEMCO operators have adjusted the gage so it reads "O" when cutter adjustment is correct within .0001".

Since this gage has been in use, hand-honing after boring has not been necessary, and set-up time has been reduced at least one-half hour a day.

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PRECISION ALL-STEEL
DIE SETS

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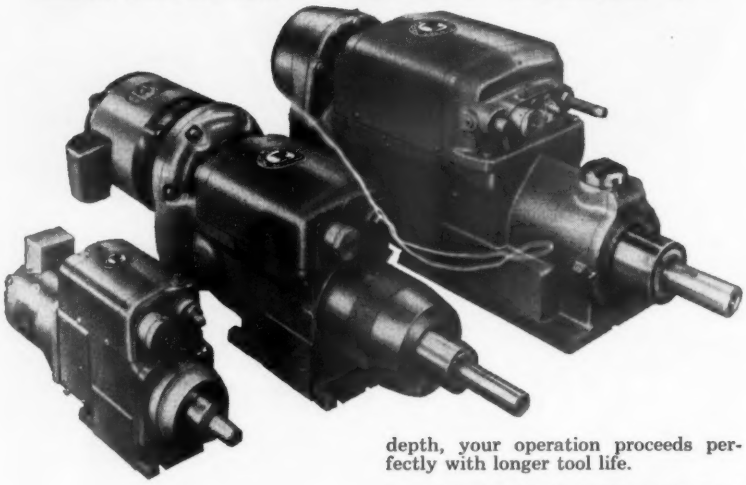

Drilling, tapping, reaming, counterboring and kindred machining operations are high on the cost factor list, principally because of the *time* and *labor* they require. Low-cost Rockwell Air-Hydraulic Drill Units can cut those time and labor costs to a minimum! They've done it in hundreds of plants —on countless applications.

THEY CAN DO IT FOR YOU! Rockwell Drill Units are hydraulically controlled, precision packaged power units that provide positive, automatic control of length of rapid approach, feed and depth. They operate in any position, either singly or in multiples, electrically interlocked with other units or mechanisms, and can be operated by unskilled personnel with a minimum of training. Once your set-up man has established proper advance, feed and depth, your operation proceeds perfectly with longer tool life.

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CIRCLE INFORM-A-GRAM KEY NO. 86

. . . Bearing Cap, from page 75

guides the bearing cap as it is pushed past the stationary broaching teeth by the ram. Three caps of different sizes are machined while using the same fixture. Two of the caps are broached with the fixture located as shown in Figure One. By merely removing four hold-down bolts, the fixture is inverted, and in this position performs its mechanical guiding function for the bearing cap with the greatest thickness.

Ford To Conduct Industrial Arts Award Program

A panel of 28 leading industrial educators and representatives of industry has been named to judge Ford Motor Company's eighth annual Industrial Arts Awards competition at Dearborn, Mich., July 14-16.

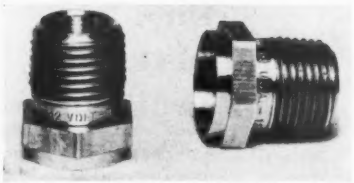
The judges will award $45,000 to the nation's junior and senior high school craftsmen. Cash awards — totaling 730 — range from $20 to $100. Thirty outstanding entrants, and their instructors, will receive three-day, expense-paid visits to Detroit and Dearborn in September.

Winning projects will be exhibited at the Chicago Museum of Science and Industry from August 7 to October 4 and in the Ford Rotunda, Dearborn, during the last week in September.

Screw Machine Parts Marked Automatically

Automatically marking over two million parts such as these automotive couplings (Fig. 1) with a 21-character impression at a total cost of less than 1 cent per 100 parts for complete marking equipment was accomplished by employing a single standard Model 500-C automatic roll marker and die manufactured by a Detroit stamp manufacturer. Marking equipment is still in perfect condition.

Total maintenance cost on the several marking operations consisted of 90 cents for a new reset spring during the three years the



Photos courtesy New Method Steel Stamps, Inc.

Fig. 1. Over one and a half million of these automotive couplings have been marked automatically with a 21-character impression during the cycle of the automatic screw machine using a standard Model 500-C roll marker and a single roll die which is still in use. Cost of marking equipment to do the job was about 1/100 cent per part.

lone marking unit has operated on a 1¼" Acme-Gridley (Fig. 2) tooled for the job. It is indicated that the cost of marking these products on a secondary operation would have been many times greater due to time and labor costs involved, reduced production output and increased losses from imperfect marking.

The first 100,000 parts were of different design and were produced from screw machine steel. An additional 400,000 parts of various designs were turned from brass, using different roll dies for the part numbers, trade marks, etc. The last 1½ million parts (Shown in Fig. 1) were machined from 5/16" hexagonal brass bar stock and were marked with a single roll die which is still in continuous use. Use of an offset roll die permitted marking within 3/64" of the hex head. Versatility of the roll holder enabled

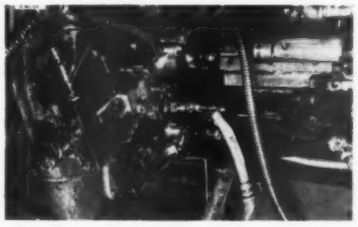
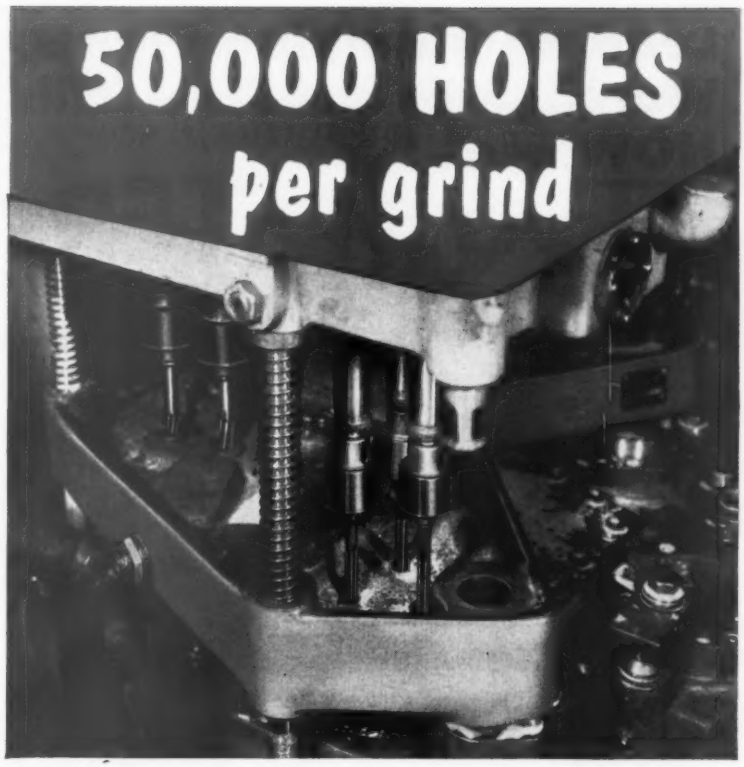


Fig. 2. This Model 500-C automatic roll marker installed on a 1¼", six-spindle Acme-Gridley screw machine has marked over two million parts during the machine cycle. According to Berlew Products, Inc., the total maintenance cost for the roll marker has been only 90 cents during the three years of operation in their Ferndale, Mich., plant. The 500-C marker is shown at station 4 in retracted position having completed marking the part now at the cut-off station (lower center).

all of these parts to be marked with a single unit, using standard interchangeable roll dies.

Screw machine operations

. . . *Continued on page 90*



Many manufacturers are discovering that Whitman & Barnes carbide reamers reduce machine down-time and costs by providing more holes per grind. Typical is the above illustrated reaming of ½" diameter holes in the cast iron planet carrier assembly at a well known automobile plant.

Six flute W & B carbide reamers were selected by this Michigan manufacturer to secure on this tough operation a maximum number of reamed holes per grind. These W & B carbide reamers are consistently reaming 50,000 or more holes before regrinding is required. This high performance is characteristic of the quality designed and manufactured into every W & B carbide reamer.

In addition to complete lines of carbide drills and reamers, Whitman & Barnes manufactures many other carbide cutting tools, also drills and reamers of high speed steel. For finest quality, long-life and a reduction in your cutting costs—select W & B tools.

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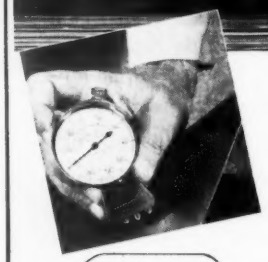

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Both disk and point type automatic welding machines are included in the rapidly expanding line of machines, machine tools, precision measuring instruments and allied products manufactured by a Dayton manufacturer. These highly specialized machines are used for high speed, low cost automatic welding of precious and semiprecious metal contacts to leaf springs, small contact arms, and other instrument components. Gold, silver, platinum, palladium, and iridium are a few of the metals used for the weld.

Photo courtesy Sheffield Corporation.

Point contacts may vary in shape from a small pin point up to a dome shape of .070″ diameter at the base and a height of .060″. The point welder will handle wire diameter from .022″ up to a maximum of .075″ on fine silver. Location accuracy of contacts can be held plus or minus .001 of an inch. Disks can vary in diameter from .025″ to .187″ in fine silver, or to .125″ in other materials. Thickness of the disk could range from .005″ to .030″ or .040″, depending upon the diameter. Both types of machines have a production rate from 1200 to 2400 contacts per hour, according to the operator's ability to load the parts into the welding station.

Welding current is controlled with a Thyratron unit. This enables the user to select at will a welding current of from one to ten cycles as required by the particular size and shape of the contact. It assures uniform current so that each and every weld is as exactly alike as possible.

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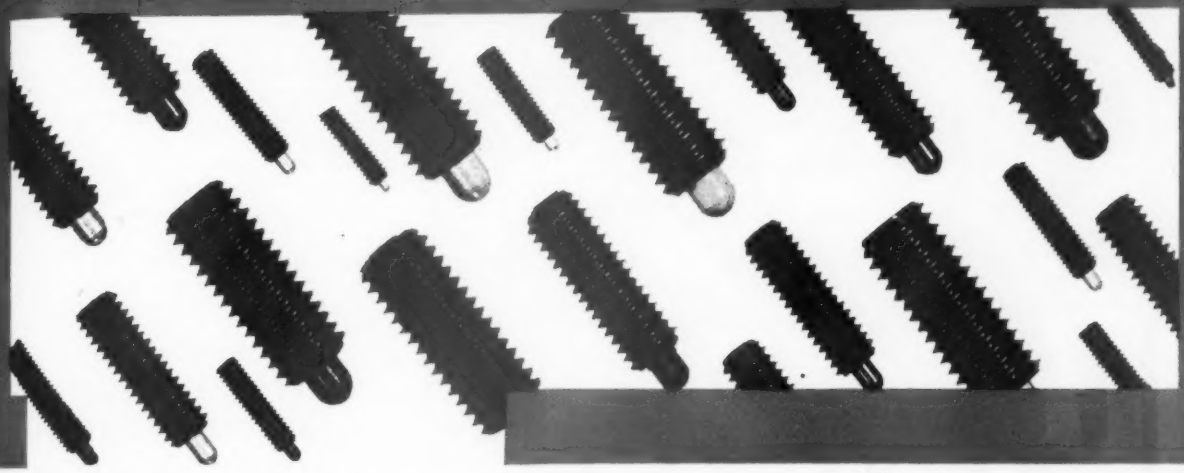

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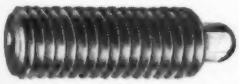
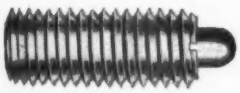


HEXNOSE

Hexagonal end simplifies adjustment and removal.
Standard Hex End: 4 sizes from ¼-20 to ½-13, with end pressures of 8 to 12 lbs.
Silvernose Hex: 4 sizes from ¼-20 to ½-13, with lighter end pressures of 2½ to 6 lbs.



STANDARD

Wherever positive spring tension is required . . . Facilitates fast loading and unloading of jigs and fixtures.
Standard End: 10 sizes from #6-32 to 1"-8, with end pressures of 3 to 42 lbs.
Silvernose: 7 sizes from #6-32 to ½-13, with lighter end pressures of 1 to 6 lbs.

Whether your production is routine or specialized you will find Vlier "performance proven" plungers are "uniformity assured" to do a better job. They speed set-ups, assure accurate machining and curtail unnecessary waste. When re-surfacing a die, Vlier Spring Plungers save hours of toolmakers' time.

There are 37 different types and sizes, each engineered for a specific need. Other sizes added when required.

Distinctive ends (light for light pressures, dark for heavier pressures) assure positive, quick identification.

Factory pre-set end pressures provide secure contact at all times. Inset hexagonal ends allow simple, quick adjustment with standard Hex key as well as permitting full utilization of screw length for better adjustment.

Screw portions are machined from selected steel alloy, plunger is case hardened; both are rust-resistant and can last a lifetime.

An assorted stock of Spring Plungers on hand assures greatest economy for it provides your tool engineers with a selection of the proper size and end pressure for every tooling requirement.

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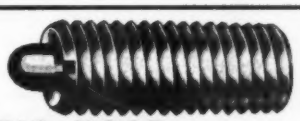

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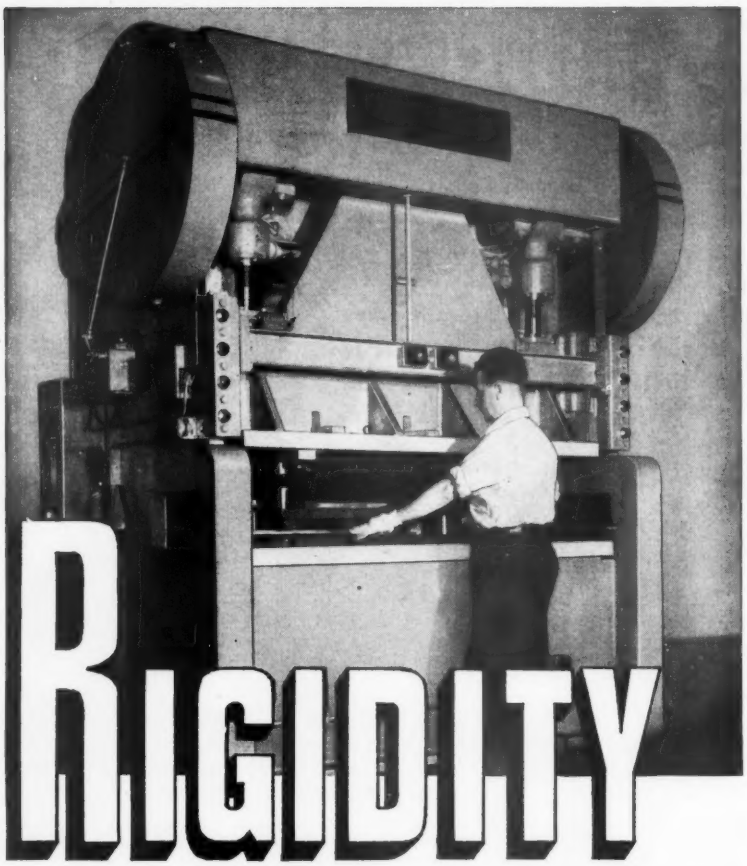

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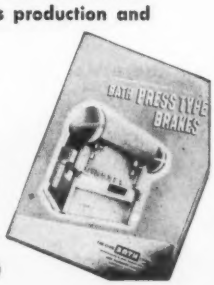
THE RIGIDITY of the Bath Press Type Brake is evidence of its high standard of construction. With speeds of 45 or 60 strokes per minute, it has many outstanding advantages such as Overload Protection, Pneumatic Clutch-Brake, End Feeding, Serial Operation etc.

The one piece welded frame, with closed side housings, makes for perfect die alignment, which means stamping, bending etc. to very close measurements. Slide areas are large, about four times those in ordinary bending presses, adequate for most of the difficult blanking, stamping and punching operations. Ram and bed working areas are flush with the forward housing and easily reached by the operator.

Under a heavy production schedule the efficient and economical operation of the Bath Press Type Brake increases production and offsets losses incurred elsewhere.

For further imformation and specifications on the Bath Press Type Brakes write for this catalog.



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(Located in the Greater Cleveland Area)

CIRCLE INFORM-A-GRAM KEY NO. 90

. . . Screw Machine, from page 87

which are performed in producing the couplings shown are:

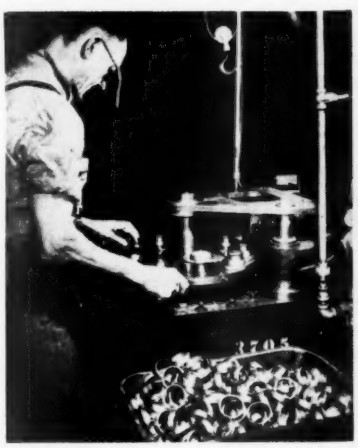
Station

6. Rough forming operation
1. Finish forming
2. Shaving
3. Thread rolling
4. Automatic marking and drilling
5. Reaming and cut-off

Although the marking unit is capable of operation at much higher speeds, spindle speed is held at 1400 rpm (290 sfm) to avoid excessive vibration of the machine resulting from the use of hexagonal bar stock. Marking one part every six seconds, the automatic marking unit has been in operation for a period equal to nearly 14 months of continuous operation, 8 hours per day and every day of the month.

FASTER AND SAFER STAMPING METHOD

This automatic stamping machine has enabled Rollway Bearing Company, Inc., to boost the rate of stamping outer races for the Company's Tru-Rol roller bearing from 300 to approximately 1,000 an hour.



Hand-operated, up-and-down punch press action is unnecessary. An operator merely loads a circular table which contains nine locating posts. As a loaded post passes along the stamping die, the die imprints the bearing identification number on the race's outside diameter. The post continues to revolve until it reaches the operator where the race can be removed easily and safely.

This stamping method also eliminates an extra machining operation. A Tru-Rol outer race has a ring groove along the edges of its inside diameter surfaces. If, as formerly, one of the face sides of the race were stamped, generally the ring groove would be distorted. To prevent this, the race first was stamped then its ring groove was machined. The new method, by enabling the race to be entirely machined, then stamped on its outside diameter, does away with machining operations after the race has been stamped.

600 Ton Hydraulic Press Combines Two 300 Ton Presses In One

The hydraulic flanging press shown here is so designed that both cylinder assemblies can be operated in unison, providing a total frame capacity of 600 tons,

Photo courtesy American Steel Foundries, Elmes Engineering Division

or each 300 ton cylinder assembly can be operated as an individual press completely independent of the other cylinder assembly.

Power for each cylinder is supplied by an individual hydraulic pump. Either or both pumps may be operated depending on whether the press is being used as a dual ram press or as a single ram press. Control is provided through a single pendant station operating on a swivel.

. . . *Continued on page 94*

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has won favor throughout industry as one of the most efficient methods of imparting extra wear to the surfaces of gages, parts and tools.

This method employing the Linde Process applies a thin wear-resistant coating of tungsten carbide in wearing surfaces to extend the life of gages and hundreds of tools many times over.

Carb-O-Plating gives you wear life of carbide at a cost substantially lower than the use of solid material can give you. And because of the steel base, the products have resistance to mechanical shock and are not subject to breakage as can occur with sintered carbide. Carb-O-Plating also increases accuracy.

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Make fast, accurate measurements with the easily attached micrometer stage. (Optional at small extra cost.) Reads to 0.0001".

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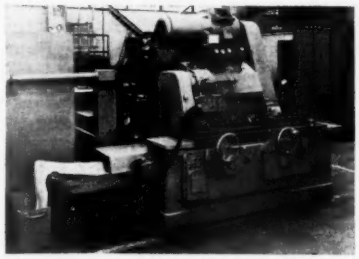
GRINDING SWARF FILTERED AND REMOVED

One of the problems confronting engineers of Norton Company's Grinding Machine Division in developing the recently announced Type CM-1 Heavy Duty Multi-Wheel Grinder was



Photos courtesy Norton Company

Fig. 1. Front view of the Norton heavy duty multi wheel grinder showing the built-in swarf remover.

the elimination of the grinding swarf produced by several grinding wheels cutting simultaneously.

In this machine, a number of grinding wheels are mounted on a heavy duty spindle between cartridge type bearings. In a single plunge grind, these wheels grind multiple diameters which

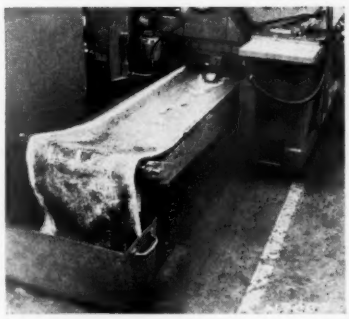


Fig. 2. Effective swarf removal on the new Norton multi wheel grinder is possible with the Delpark filter arrangement shown here.

may be of different dimensions. This one machine may easily do the work of several machines in a plant set up for high production grinding.

Normally the down time required to remove the grinding sludge from these wheels would be considerable. To provide automatic and continuous sludge removal, Norton engineers adapted certain components of the Delpark filter, made by Industrial

. . . *Continued on page 96*

LO-JET ACRO

Now! the new improved mist cooling system!

the revolutionary new coolant system that keeps cutting tools and work at below room temperatures... prolongs tool life, cuts tool breakage loss... saves money...speeds production...keeps work clean...protects operators and is fireproof!

More efficient and adaptable—with separately controlled multiple spray heads. One nozzle can produce a true fog spray while another gives a liquid stream.

Easier to regulate—master panel control now makes every adjustment simpler, much more accurate. Spraymix control, attached by flexible tubes to top of unit, makes for easy positioning and precise, constant spray control.

More compact—all controls, regulators, gauges are **in one place,** at the operator's fingertips.

Smarter looking—a single neat, green wrinkle-finish case houses all mechanisms and controls. The new design eliminates excess piping.

Portable or stationary—mounting permits 'round-the-plant portability, and sturdy bracket mounting also provides for permanent one-location use. Both mountings come with unit.

LO-JET ACRO

there's a Lo-Jet Acro system for every purpose, every machine—write now for details!

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Gentlemen: Please send me full information about the new Lo-Jet Acro mist cooling system.

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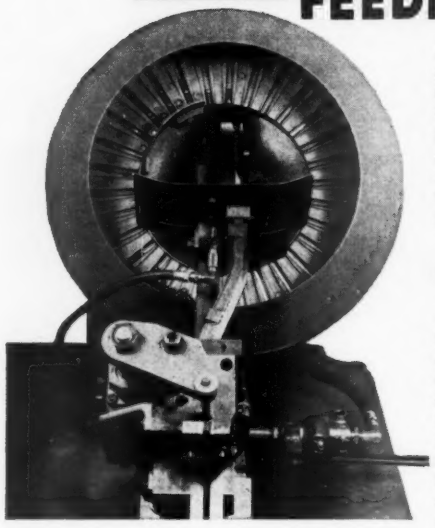
CIRCLE INFORM-A-GRAM KEY NO. 93

Get on the Right "TRACK"

with your SMALL PARTS!

• DISCARD SLOW MANUAL FEEDING!

Use DPS SELECTIVE FEEDING DEVICES



● Note the improvement in Lower Costs, Speedy Production, Quality Control and Increased Profits . . . Now, this DPS contribution to the metal-working industry is emphasized in an expanded line of selective feeding devices and engineering service . . . Tell us your requirements; we have the unit and the know-how to meet your needs.

DPS BARREL-FEEDER

● Here is an interesting case showing separate screws and lock washers that were loaded into a single feeder and ejected loosely assembled at the rate of 60 to 70 a minute . . . An amazing speed increase over slow, manual operation. In this instance, as in thousands of other applications, the unit was designed with the idea of maximum feeding of a wide variety of parts at a fraction of the cost of manual feeding.

DPS BOWL-FEEDER

Our Newest Addition

● An electric, vibrating unit that advances the parts on a circular spiral, aligning and correctly locating them to issue directly into the work area in proper time cycle. Provides fully automatic feeding of light, fragile parts that normally could not withstand tumbling.

Let us diagnose your symptoms and prescribe the proper remedy. Write for details.

DETROIT POWER SCREWDRIVER CO.

2827 W. FORT ST. DETROIT 16, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 94

. . . Hydraulic Press, from page 91

This press is an excellent example of the adaptation of standard hydraulic press designs to meet special production requirements.

The manufacture builds a complete line of hydraulic metal-working presses covering the full range of standard types, sizes, and capacities. In addition, their engineering staff is available for suggesting adaptations or even entirely new designs wherever these would mean better performance and lower production costs on special-purpose use.

Automatic Transfer Machines

A new automatic production line of four transfer machines has been designed and built for machining automotive transmission cases. All four transfer machines combine the facilities of 247 tools to complete 265 operations in 29.5 seconds, averaging 122 cases per hour at 100% efficiency. The 17-station transfer machine shown in the photograph is the second machine in the line. It performs drilling and reaming operations on the bottom, top, and end of the transmission cases.

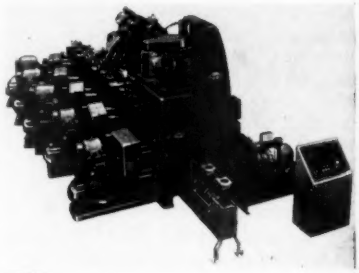


Photo courtesy Greenlee Bro. & Co.

Outstanding features of these machines are the safety devices for the protection of the operating personnel and the machine. Steel mesh guards are provided on and between each working station and are hinged to allow easy access to the transmission cases for inspection and removal. All guards are electrically interlocked, permitting the machine to run only when all the guards are locked down. Each machine is equipped with an easy-to-reach emergency cord for stop-

ping the machine from any position along its entire length. All functions of the machines are hydraulically operated and electrically interlocked and any malfunction is readily detected and the trouble located immediately by a system of lights mounted on the operator's control cabinet.

Flame-Plating Ups Draw-Die Life

Flame-Plating, the method of applying a tungsten carbide coating to wear surfaces of metal parts, has increased the productive life of draw dies 75 percent. A single flame-plated draw die used at Ford Motor Company's Mound Road Plant, is turning out 250,000 parts as opposed to 40,000 parts produced by an unplated die.

Formerly unplated dies were used for one month with much downtime. The flame-plated dies

Photos courtesy of
Union Carbide and Carbon Corp.

Examples of a Ford hand-brake part. (Top) 40,000th piece from the draw die before flame-plating, note ragged abrasions. (Center) This is the first part run on a flame-plated draw die. (Bottom) Here is the 100,000th piece run on a flame-plated draw die. Although some abrasion is evident, parts were still acceptable up to 250,000.

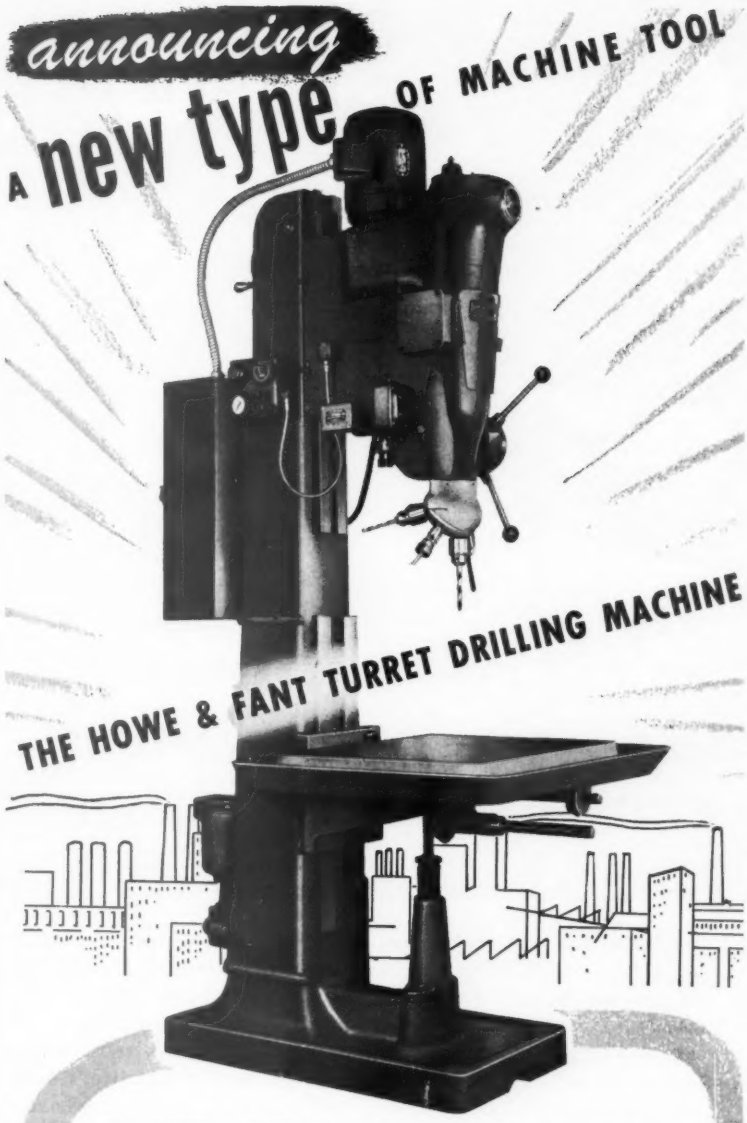
are being run for a month and a half with considerably less down time, and over six times the productive output.

Also, Ford's Plastics and Machining plant has increased the productive life of steel core rods (for powdered metal fabrication) as much as 12 to 27 times, by having them flame-plated. The pro-

. . . *Continued on page 174*

announcing

A new type OF MACHINE TOOL



THE HOWE & FANT TURRET DRILLING MACHINE

The HOWE & FANT Turret Drilling Machine is a revolutionary development that does for drilling what the modern turret lathe does for turning.

FASTER. One operator performs up to six different drilling and tapping operations, in any sequence, at a single station. No time is lost moving work from one station to another. Speeds, depths, and reversals for tapping are all pre-set, and require no attention during successive operating cycles.

MORE VERSATILE. Speed of each spindle is independently determined, and is infinitely variable from 200 to 4000 rpm. Depth stops are individually set for each spindle, and are accurate to less than 0.002 inch. For tapping, automatic reverse at twice forward speed is available at each spindle.

LOWER COST. All this is yours in a half-inch capacity machine that takes only 34 by 50 inches of floor space . . . at a basic cost of $2950.

HOWE & FANT, INC.
33 Fitch Street, East Norwalk, Conn.

Send for Bulletin 5403 today!

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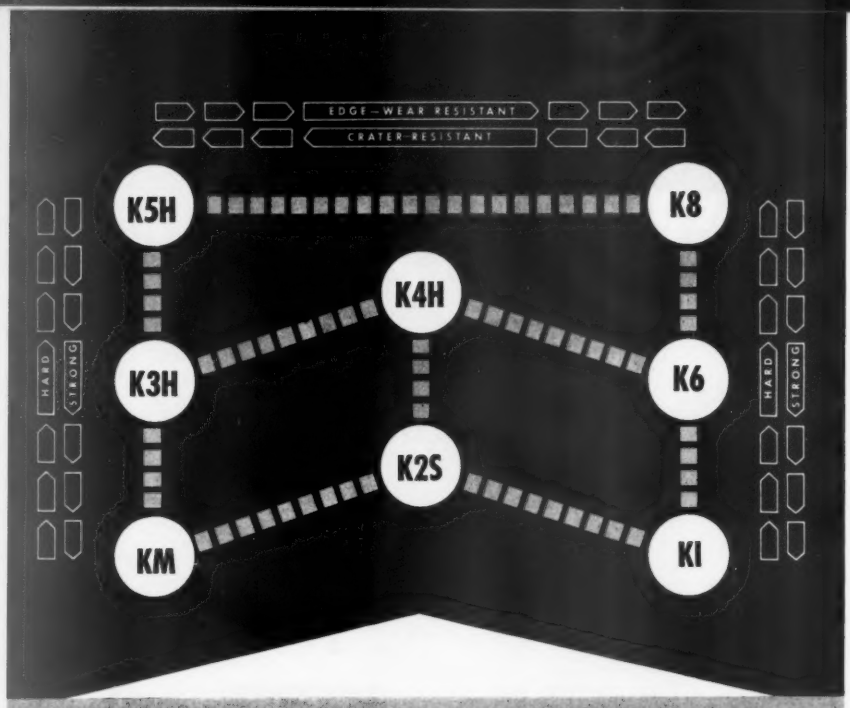
(Please attach to, or write on, your company letterhead)

CIRCLE INFORM-A-GRAM KEY NO. 95



NOW- A Quick, Easy-to-Use Guide to Efficient Machining

Here's the first simplified system for selecting carbide tool grades. Kennametal's new grade selection method assures top tool performance on every machining job. It's easy to use and eliminates guesswork because grades are grouped according to their wear characteristics (edge-wear and crater-resistant); also according to relative strength with strong, intermediate and hard grades included in each group. These eight Kennametal grades meet all machining requirements.

Kennametal's grading system is unmatched in the industry for simplicity. Any experienced machinist can use it to quickly adjust grades for better tool performance. For example: If K3H is being used and crater is no problem, a switch to K4H, which is more edge-wear resistant, will provide longer tool life. Conversely, if K4H is being used and crater is excessive, a switch to K3H would improve tool life.

Your Kennametal representative will gladly help you apply this grade selection system to your machining operations. He can also help apply these eight grades to "wear spots" in your product, your processing lines, or any place a hard, wear-resistant metal is needed. Just give him a call. Kennametal Inc., Latrobe, Pa.

*Registered Trade Marks

KENNAMETAL*
CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

SALES OFFICES IN PRINCIPAL CITIES

A-15

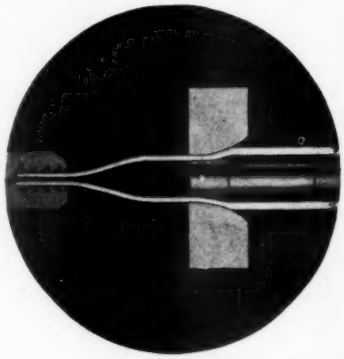
. . . Grinding, from page 92

Filtration Company of Lebanon, Indiana. This unit consists of an endless chain belt type conveyor on which rides a strip of disposable filter material. The conveyor forms a trough into which the used coolant falls. As the filter medium becomes loaded, a float control advances the conveyor to bring clean filter material into position. The swarf which has been filtered is collected on the filter medium in a metal receptacle for easy disposal.

With such a filter arrangement the coolant sump on the machine will rarely require attention.

Cold Drawing with Carbide Mandrels

Drastically reduced mandrel costs together with elimination of practically all tube scrappage, is being realized at the plant of one of the nation's most prominent midwestern fabricators by a switch from chrome-plated steel



Photos courtesy Kennametal Inc.

Fig. 1. Cross-section view showing tube grippers and mandrel. Also is shown the reduction of tube diameter and wall thickness as the tube is drawn through the die.

mandrels to those of tungsten-titanium carbide for cold drawing seamless steel tubing.

Their operation, which is performed at 75 fpm on a 150 hp Aetna-Standard cold-drawing bench, consists of reducing 1 ½" diameter by 0.083" wall SAE 1010 steel tubing to 1 5/16" diameter with a 0.063" wall. Tube length when brought to the draw bench is 9' 8": after processing, length is 15' 9". Both outside and inside diameters of the tubing are held to tolerances of + 0.001", -0.005".

Drawing Costs Drastically Slashed — Average draw-life of their previously used chrome-plated mandrels and others made of standard carbide material was only about 500′. Since chrome mandrels cost $2 each, mandrel cost per foot of tubing produced was $0.004, or 40c per hundred feet. At the time of the fabricator's last report, their Kennametal grade K-84 mandrel nib had drawn 440,435′, showing only 0.003″ wear. Under their new mandrel setup, cost is only about 1 1/10 cents per hundred feet.

This same amount of production would have required 880 chrome mandrels at $2 each or a cost of $1760. Since scrappage with chrome mandrels averages about 5%, a production of 440,435′ would have resulted in 22,022′ of scrap tubing. At 15 1/2 cents per foot, loss would have amounted to about $3413. To date their carbide nibs have provided them a savings of over $5000. Additional production savings are also obtained as a result of minimized machine-downtime required for mandrel changing. Equivalent results are obtained in other similar operations using larger sizes of carbide mandrels.

Fig. 2. Aetna-Standard cold-drawing bench set up to reduce 1 ½″ diameter by 0.083 wall steel tubing to 1 5/16″ diameter by 0.063″ wall. K-84 mandrel nib was used in this setup.

Kennametal K-84, the tungsten-titanium carbide die grade utilized, possesses resistance to pick-up or galling, which makes it most outstanding for handling today's exacting drawing operations.

For Defense

U. S.

SAVINGS BONDS

Big work—bulky shapes—heavy jobs—all can be drilled quicker, easier on the Sibley Model E-25 Drilling Machine. 22″ x 30″ table; 25″ swing; pedestal jack supports table; variable speed drive for drills ⅛″ to 1″; table alignment to spindle—.0007″ in six inch radius; 1½ h.p. motor; convenient speed control; tachometer indicates exact spindle speed.

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Send complete story on Model E-25 with extra large table.

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CIRCLE INFORM-A-GRAM KEY NO. 97

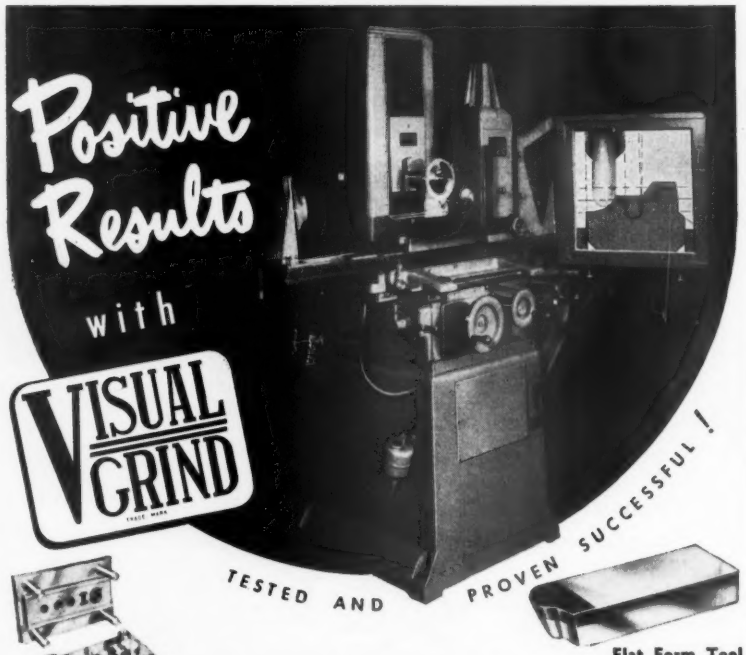
Film For Tool Steel Users

A new tool steel film entitled, "The Heart of the Matter," is available for showing from the Latrobe Steel Co., Latrobe, Pa.

The 22½ minute, 16 m.m. color sound motion picture is designed for all tool steel users and for consumers of finished tools. It is shown with a new, self-contained, desk-type projector which eliminates the need for a completely darkened room. Groups of up to 40 people may view the film on this projector—in the shop or office. However, conventional "reel type" copies of the film are available for larger groups.

The film covers tool steel manufacture, quality control and tool stresses.

Contact your local Latrobe representative or the home office for a showing in your plant.



Progressive Die

Flat Form Tool

Here is precision contour grinding at its best. Steel and tungsten carbide form tools, die sections, templates and related items are efficiently processed in dependable, economical fashion. Our basic magnetic chuck work-holder affords positive positioning yet with flexibility for cam, circular and index grinding with the proper fixtures. Work-piece quality is controlled visually at all stages, either while using pre-dressed grinding wheels or when generating the required contour by means of successive, controlled movements. Durable construction around precision optics insures rigidity and long life.

Circular Form Tool

Blanking Die

Dovetail Tool

Ask for Bulletin T-6

VISUAL GRIND THE CLEVELAND GRINDING MACHINE COMPANY
1643 EDDY ROAD • CLEVELAND 12, OHIO
New Possibilities in Optical Grinding

CIRCLE INFORM-A-GRAM KEY NO. 98

Telescoping Cylinder Now on Market

A telescoping cylinder that was made for a special hydraulic press of the pull-down type has been put on the general market.

Photo courtesy of Greenerd Arbor Press

The cylinder was developed to move the main cylinder and ram of the special press to different points above the work table, and hold it there for an indefinite time, and in an accurate position without dropping, within a period of 12 to 15 hours. The construction of the cylinder is of Meehanite metal and steel (that is, one cylinder would be Meehanite, the next one steel, and the next one Meehanite) carefully bored and honed to size and equipped with "O" rings, and of the single action type. The rating at 1000 lbs. per square inch would be as follows: The first sleeve would have 15,900 lb. lift with a full length of travel of 6⅝"; the second sleeve would have 8,295 lb.lift with 6⅜" travel; the third sleeve would have 3,976 lb. lift with 6⅛" travel.

The shut height from eye to eye is 14". Full extended height, with three cylinders extended, from eye to eye is 33⅛". All tolerances are held extremely close. This cylinder is made for oil power only.

Metal Finisher Seminar

The National Federation of Metal Finishers has announced that its second Management Seminar will be held Tuesday, July 13, 1954 at the Statler Hotel, New York City. The Seminar is being held in conjunction with the Annual Convention of the American Electroplaters' Society.

Precision Turning Grinding Machine For Multiple Work

A new precision turning and grinding machine developed especially for the jet engine industry, but applicable to any work on which exceptional tolerances are required on concentricity and parallelism of turned and ground surfaces, has been developed.

Photo courtesy of Kaydon Engineering Corp.

Contour turning underside of machine table on series 3100 machine.

Designed to perform multiple turning or grinding operations in one setup, the versatile new 3100 Series machine has four table sizes — 36″, 48″ and 52″, all with a 60″ swing.

Among the many unique features of the machine is the work table arrangement. Power for driving the work table is provided by a 10 hp direct-current drive unit, with power transmitted to the table spindle through a "timing" belt.

Versatility makes the machine an excellent unit for tool and die work. And the machine is particularly well suited for experimental departments in large manufacturing plants. Because it performs several operations in one setup, the new machine offers virtually unlimited opportunities for reduced tool costs.

Lathe Attachment Reduces Machining Costs 70 Percent

A new type of lathe duplicating attachment has recently been introduced which is said to cut machining costs as much as 70%. It has tracer follower accuracy of .0002″ and a low tracer pressure of 3 ½ ounces, permitting its use for close precision work.

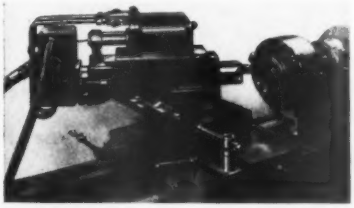


Photo courtesy of Acc-U-Mat Machine Co.

The duplicating attachment is easily mounted on any standard lathe and does not interfere with normal operations when not in use. When as few as six identical pieces are to be produced, a template is made and the tracer follower guides the lathe cutting tool for inside and outside longitudinal turning of shoulders, chamfers, compound radii, thread runout grooves and other intricate shapes. Likewise, facing work is also done with this unit.

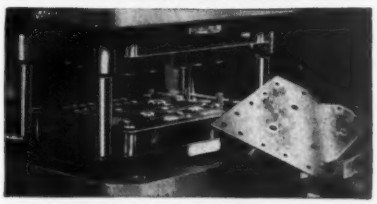
New • Fast • Proven

LOW COST methods for PERFORATING and NOTCHING SHEET METALS

REDUCE DIE COSTS

All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION**—*Down time is minutes as compared to hours for changeover.* For precision work in all types and sizes of presses. **START PRODUCTION AT ONCE.** Pierce materials up to ¼″ thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.

Whistler *MAGNETIC* Dies at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.



Whistler *ADJUSTABLE* Dies on perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

● Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

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Adjustable, Magnetic, Custom and Cam Dies for all Industry

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For your convenience **Whistler direct factory representatives are located in most principal cities. Their on-the-job application experience, combined with Whistler's 35 years experience in the manufacture of tools and dies, is available on request.**

CIRCLE INFORM-A-GRAM KEY NO. 99

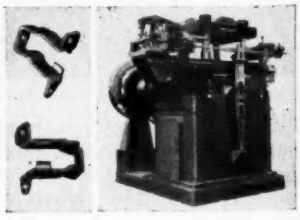
If you have to produce more in a given time — the proven answer is a Henry & Wright Dieing Machine. Here is the capacity that enables you to keep pace with sudden scheduling changes; the consistent accuracy that permits you to set and automatically meet higher standards of work quality, while reducing cost.

In the Henry & Wright Dieing Machine, you have a production tool designed for high speed, built to widen radically the practical application of progressive stamping and engineered to prolong the life of your dies. Outstanding in its application for light and medium gauge metals, the Dieing Machine is also demonstrating that it can achieve equally extraordinary results in stamping and forming heavy gauge parts.

You owe it to yourself to include the Henry & Wright Dieing Machine in your plans for modernization, expansion or replacement. We welcome an opportunity to discuss its specific application to your requirements.

25-ton Henry & Wright Dieing Machines with twin die set-ups produced 435 parts per minute per machine at Barber-Colman.

200-ton Henry & Wright Dieing Machine producing 54 completed hinge boxes per minute from 5/32" x 13" steel in coil form.



ONE SET UP INSTEAD OF MANY WITH H&W DIEING MACHINES

HELPFUL DATA *is available in our fact-packed catalog which you can have by writing Henry & Wright, 511 Windsor St., Hartford, Connecticut.*

HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

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CIRCLE INFORM-A-GRAM KEY NO. 100

If you have jobs that you PUSH .... PULL .... or CLAMP..

by hand...you can do it Better and Faster by Air

The simple incorporation of Bendix-Westinghouse air cylinders to your machine tools and fixtures will step up your production, increase operator safety and reduce unit costs.

Call a Telco sales engineer today! Let him describe this easy way to increase manufacturing efficiency. A-7111

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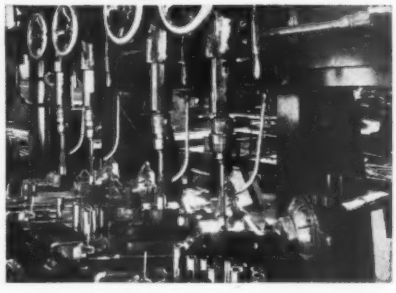
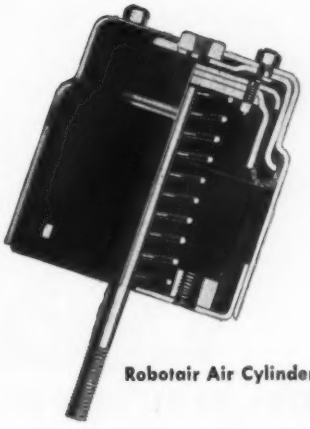


This bank of four Robotair Air Cylinders applied to production tapping operation increased hourly output more than 30% over manually operated vises.



Robotair Air Cylinder

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CIRCLE INFORM-A-GRAM KEY NO. 100.1

APPLICATION OF VAPOR BLAST

Following proven economies in production finishing of parts for the J-57 jet engine, the Ford Aircraft Engine Division at Chicago has set up a Vapor Blast—-Roto Finish department. The new department has the full time assignment of mass producing the specified surface finishes necessary in precisely built power plants for military aircraft.

One of the jobs that has established the value of the new finishing method supplied by vapor blasting was an 80% reduction in the time required to finish an aluminum diffuser. Originally it took 11 hours to develop the specified finish. With the introduction of 17 minutes of vapor blasting, the job was immediately cut to 2 hours, an overall saving of 8 hours, 43 minutes. Since then the vapor blasting time has been reduced from the original 17 down to 5 minutes, according to William Yeoman and E. R. Kopcinski, supervisors of the section.

The Ford production men are applying the vapor blast liquid honing process to produce a metallurgically clean surface prior to plating, polishing, lapping or other coating processes. It is also used to remove machining or directional polish lines, marks and stains.

In addition, the liquid honing process is applied to produce a controlled and wettable surface to retain lubricants uniformly. The process also removes fine burrs on metals and alloys, resulting in a matte finish which increases the tensile strength and relieves stress concentrations through impact.

This finish is necessary on gears to release grab from metals and to reduce the noise in gear trains by giving a non-directional finish to retain and evenly distribute the lubricant.

In its essence vapor blasting is the application of a mixture of abrasive, water and rust inhibitor from a special gun at high velocity. The high pressure stream is directed against the surface being treated, throwing 65 cubic feet of air per minute at 90 pounds pressure.

The roto finish process is a modern tumbling method which was highly developed during the war. In this operation small parts are placed in a rotating, rubber-lined cylinder along with mixtures of various sized chips and chemical compounds suited to the particular result that is desired. The degree of finish and speed of the work is regulated by the size of chips and choice of compounds.

Mr. Kopcinski says that a controlled action roto finish can remove heavy burrs or attain precisely uniform surfaces to exact tolerances easily, economically and in large quantities.

A similar, even more precisely controlled operation is afforded in an adaptation of the vapor blasting process where a tumbling barrel is introduced into the vapor blast cabinet and a fixed gun applies the abrasive solution.

International Harvester's East Moline Works has boosted forging die life by more than 25% and eliminated the final stages of polishing new and re-dressed dies with the vapor blast metal finishing process.

Following controlled tests which increased practical die life from 35,000 pieces between sinkings up to 90,000, East Moline Works adopted vapor blasting as a routine operation in finishing, repairing and redressing its dies.

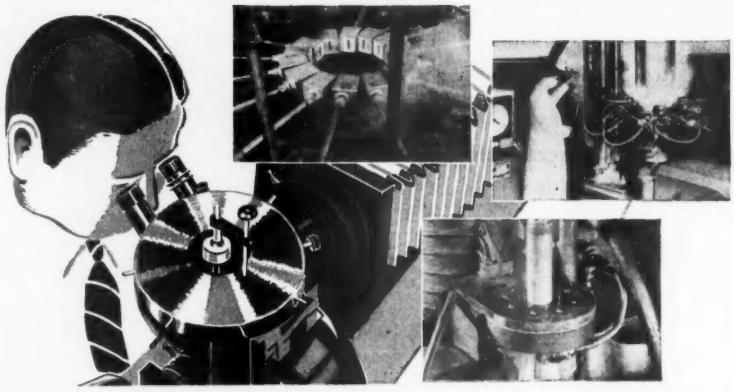
Under the previous method, a Harvester spokesman said, East Moline prepared dies by hand sinking and scraping, obtaining 35,000 impressions between redresses. The first deviation from the old practice was the addition of chrome plating (without vapor blasting), boosting the life to 69,000 pieces.

When vapor blasting was added to this procedure the figure jumped to 120,000.

In the next test chrome plating was excluded, so that the operation included hand sinking and scraping, followed by vapor blast. This resulted in an average life of 90,000 pieces for each die and was adopted as standard procedure.

Chrome plating was left out of the standard procedure as impractical, Harvester said, since it was adaptable to only a limited number of special dies.

At Lakeside, Where Metallurgy Controls the Treatment



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Lowers Your Steel Improvement Costs

Lakeside's metallurgists are men of authority whose responsibility stems far beyond the laboratory . . . deep into the actual processing of your steel. Special consideration is given your individual treating problem and recommendations made for the specific process best suited to your most exacting specifications. From perfected, mechanized and controlled processing to precision inspection and testing, metallurgical science controls every step at Lakeside. Why not apply the inevitable economies of this kind of operation to your steel treating problem? Call or write today!

Our Services:

Electronic Induction Hardening, Carbonitriding, Flame Hardening, Heat Treating, Bar Stock Treating and Straightening (mill lengths and sizes), Annealing, Stress Relieving, Normalizing, Pack, Gas or Liquid Carburizing, Nitriding, Speed Nitriding, Aerocasing, Chapmanizing, Cyaniding, Sand Blasting, Laboratory Physical Testing.

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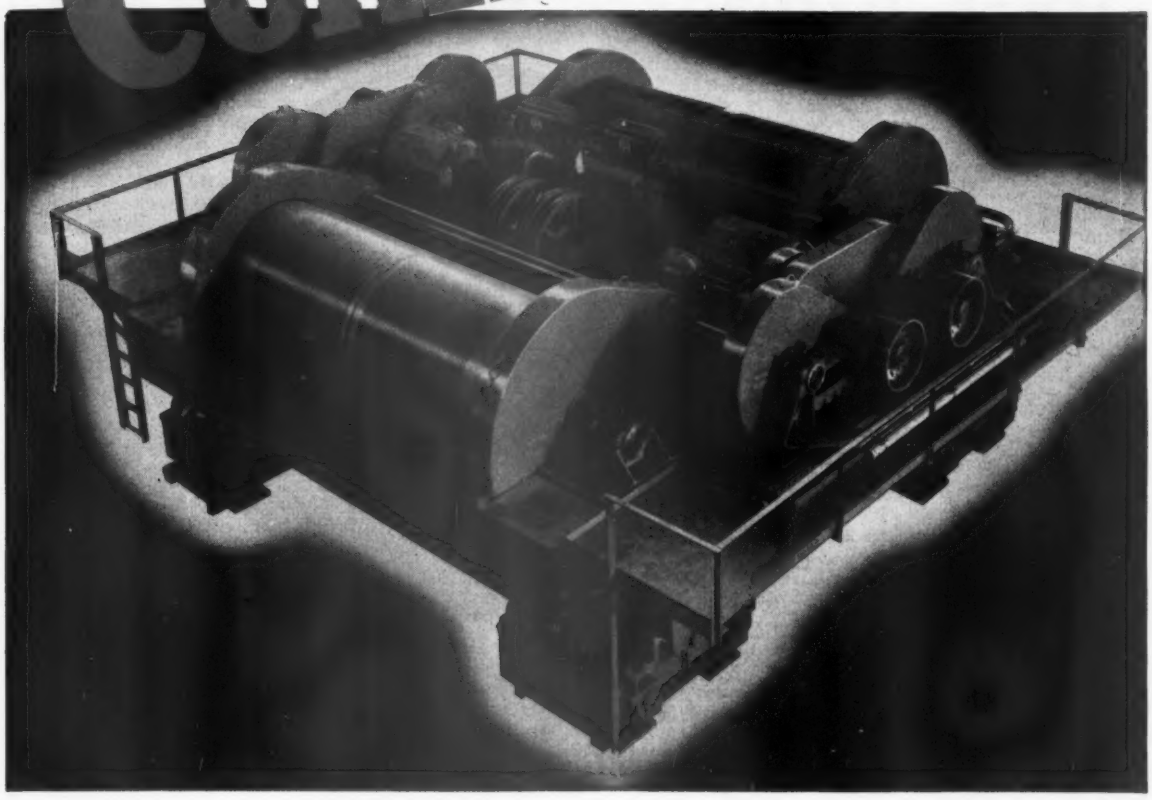
Confidence!



...in MEEHANITE metal for heavy duty service!

● The utmost confidence in Meehanite metal is demonstrated in its selection for cable drums in this main trolley for a 250-ton capacity crane. To get an idea of size, it should be noted that each of the four drums shown weighs 14,500 lbs. and is 62" diameter x 8' 4" long. Of course, this is only one of hundreds of installations as Meehanite is one of the premium materials for crane drums used by the industry.

Meehanite metal performs better as a crane drum material because its high compression strength (175,000 p.s.i.) and toughness resists the scuffing action of the cables indefinitely. The pattern of the cable is never worn into the grooves. Grooves remain smooth and true, assuring a much longer life of the cables.

The unusual combination of physical properties found in Meehanite metal makes it ideal for this and many other applications. Consult us or have a castings engineer call to discuss your problems.

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CIRCLE INFORM-A-GRAM KEY NO. 100.3

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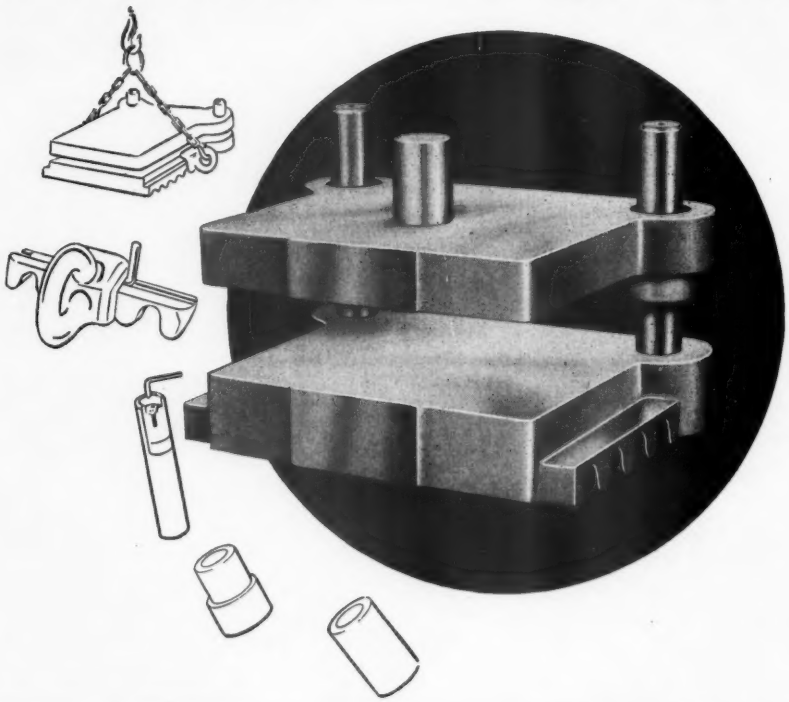

ONE STOP SERVICE FOR THE FOLLOWING TOOL ROOM NEEDS

ACME STANDARD BUSHINGS:
Drill Jig Bushings and Liners stocked in ASA & Acme Standard finished or with Grinding Stock; Liner pins and liner pin bushings; Leader pins and leader pin bushings.

FASTENERS & LOCATORS:
Socket Set Screws; Hex & Socket Head Cap Screws; Shoulder Screws; Flat Head Cap Screws; Pipe Plugs Regular & Dry Seal; Dowel & Taper Pins + .002 Dowels; Allenuts; Hex Head Nuts, Screws, Washers.

JERGENS STANDARD COMPONENTS:
Over 500 Standard parts including: Blank Jaws; Sine Fixture Keys; Clamp Shoe Assemblies; Thumb Screws; Jig Rest Buttons; Quarter Turn Screws; "C" Washers; Hand Wheels; Strap Clamps; Studs; Tee Set Kits, etc.

FEATURING REMOVABLE CAP GUIDE PINS

Enjoy the decided superiority of SUPERIOR DIE SETS and SUPPLIES including die springs, layout dies, lubricants, pins & bushings, bolster plates, etc., immediately available from Jergens. Superior Die Sets are available with easily removed cap guide pins that save time, effort, minimize danger of damage to costly dies.

Superior Die Sets and Accessories are distinguished for their long, accurate press runs—their precision manufacture of quality materials and for their exclusive safety features which safeguard against injury to handlers plus easier lifting and manipulating.

All these quality Superior features mean time, material and labor savings for you.

Write for complete specifications and price list.

Jergens BETTER TOOLS AT LOWER COST

TOOL SPECIALTY CO.

712 E. 163rd St. CLEVELAND 10, OHIO

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CIRCLE INFORM-A-GRAM KEY NO. 100.4

— QUICK-PIC CATALOGS —

News and Views of Current Literature

IMPACT HAMMER

This Air Power Catalog for 1954 includes a section on how to cut costs in investment, setup and production with the impact hammer. Also discussed are air presses and rotary work feeders. Available from the Mead Specialties Co., 4114 N. Knox Ave., Chicago 41, Ill., the booklet includes illustrations and specifications.
Circle Inform-A-Gram No. E1

TUBE BENDING PRESS

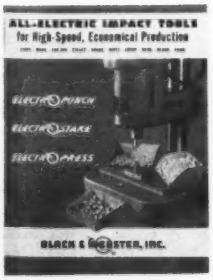
An illustrated bulletin describing the mechanical features and operating advantages of a new 20-ton hydraulic bending press is being offered by Pines Engineering Co., Inc., Aurora, Ill. The publication describes many new design innovations and also shows typical applications and gives complete specifications.
Circle Inform-A-Gram No. E2

PILLAR PRESSES

Extensive details on a modernized line of multiple plunger pillar presses are contained in literature offered by the Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. The bulletin illustrates several sizes of the machines; shows examples of work produced on them and presents details on the tooling.
Circle Inform-A-Gram No. E3

KNUCKLE JOINT PRESSES

Outstanding features, general data, illustrations, dimensions and specifications are contained in this 20-page catalog available from the Cleveland Punch & Shear Works, Inc., Cleveland 14, Ohio. Also included in the brochure is a section on the firm's patented drum type air friction clutch with spring loaded brake.
Circle Inform-A-Gram No. E4



IMPACT TOOLS

Solenoid-operated production tools are described in an illustrated bulletin just issued by Black & Webster, Inc., Newton 58, Mass. The catalog contains information on the Electropunch, Electropunch, Jr., heavy-duty Electropunch, Electrostake, Electropress and accessories.
Circle Inform-A-Gram No. E5

HYDRAULIC PRESSES

Discussed in Catalog No. 129 are hydraulic presses that are electrically-operated, air operated and hand operated. These presses range from one to 25 tons and most press problems can be handled by one of the many stock models. For your copy of the catalog, write to the Dake Engine Co., Grand Haven, Mich., or—
Circle Inform-A-Gram No. E6

DOUBLE CRANK PRESSES

Recommendations for the modernization and conversion of straight-side and gap-frame double crank presses are contained in a 16-page brochure available from the E. W. Bliss Co., Canton, Ohio. Eighteen examples of 42 conversion assemblies developed to revitalize obsolete or worn-out presses are described.
Circle Inform-A-Gram No. E7

PRESS BUILDING SERVICES

In response to growing interest in the opportunities for the modernization of stamping presses through rebuilding, the Verson Allsteel Press Co., 9300 S. Kenwood Ave., Chicago 19, Ill., is reissuing its Bulletin No. R-49 entitled, "New Life for Worn-Out or Damaged Presses." Shown are typical rebuilding jobs.
Circle Inform-A-Gram No. E8

BALL BEARING DIE SETS

The advantages of ball bearing die sets are outlined in this illustrated brochure available from Lempco Products, Inc., Bedford, Ohio. General dimensions, specifications and diagrams combined to make this booklet a highly informative publication. Also included, is a section on press and tool room equipment.
Circle Inform-A-Gram No. E9

PIVOT PUNCHES

This catalog will suggest many ways that pivot punches help produce new, different and better products. Its 20 pages depict facilities for and examples of tools, dies, jigs, fixtures, and gages. The catalog can be had by writing to the Pivot Punch and Die Corp., North Tonawanda, N. Y., or —
Circle Inform-A-Gram No. E10

THE HUMAN ELEMENT...CATALYST IN PROPER PLANNING FOR A DIVERSIFIED ASSEMBLY OPERATION*

by J. E. Adams
Director of Purchasing & Planning
THE WHITE MOTOR COMPANY
Cleveland, Ohio

PROPER PLANNING of Assembly Line Work in Small Quantity Production, is another way of saying, "How does one run a job shop efficiently?" The assembling of the product manufactured by a factory of this type is usually the simplest part of the operation. The key to efficient operation is a smooth flow of the short-run components and details to the line or assembly bench, without the need for carrying excessive in-process inventories.

The special or diversified product manufacturer must be in a position to engineer his product in a relatively short time and to manufacture it with a conservative concept of tooling. Extensive specialized manufacturing equipment would usually make the price of his finished product prohibitive. When it comes to Planning techniques, similar problems arise.

The custom manufacturer patiently waits for the customer's order to be received, and then all phases of the organization go to work on the special details for this one order. The same pattern is repeated with each of the "customized" products manufactured in this type of operation.

Planning for assembly by a manufacturer of industrial equipment, industrial trucks, or heavy-duty trucks engineered to specific customer's specifications is extremely complex. Sufficient material must be available to maintain a large dollar volume of production, comprised of a wide variety of finished products with many specially engineered parts, and short-run quantities flowing to the assembly line. The suppliers to these manufacturers are faced with the same problems as their customers, as the problems are passed on down the procurement chain.

It may be possible to establish a good advance total unit projection, but the application of the vehicle will have a substantial effect on the optional and special parts. We may, therefore, accept as another aspect of our problem the fact that the specialized job shop producer is much more seriously influenced by day-to-day production problems resulting from sales than is the large volume "mass producer".

Engineering must be alert to the demands of many customers with varying problems, rather than to the general need for a standardized product . . . and all Planning, Procurement, and Manufacturing techniques must be directed to accomplish the end

*Condensation of paper presented by Mr. Adams before the SAE National Production Meeting, and published here through courtesy of the Society of Automotive Engineers, Inc.

JOHNSON BAND SAWS

SPECIFICATIONS
MODEL B

Capacity—5″ rounds, 10″ flats.
Height Overall—(Closed)—32″.
Blade Length—7′5″ x ½″ x 23 ga.
Floor Space—46″ x 28″.
Weight—(Uncrated) 235 lbs. Crated 280 lbs. Boxed for Export 400 lbs.
Wheel Diameters—10″.
Motor—⅓ H.P. any voltage available.
Speeds—45, 90 and 150 ft. per min.
Casters—Optional at slight extra cost.

MODEL J, 10″ x 18″ CAPACITY ALSO AVAILABLE
WRITE FOR DETAILS

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 102

of producing the specialized product in the most efficient manner, in the shortest time possible. In a word, "flexibility" is our objective. Now how do we do this?

The components which must be planned for the diversified production assembly line are divided into three distinct categories:

The so-called standard material is programmed on the basis of economical runs, and sound, conventional inventory practices. Even in this group, the type of manufacturer we are discussing has more combinations and available types or models than the so-called "mass producer".

The optional material is planned on the basis of past usage, plus contributing factors, such as new designs and other developments in the industry, which could affect the usage of the part. A new state law affecting loading limits or over-all length could influence axle specifications, wheel base, and many other items. Consequently, we must provide individual consideration of the demand for each item by experienced personnel—which is another step beyond standardized Planning.

The third group, comprised of strictly special equipment, would theoretically be ordered specifically to each customer's requirement. However, in practice we cannot overlook manufacturing economies and potential future usage. For example, if a Company had an order which required 5 pieces of a special machined part, it might be worthwhile to manufacture 10 or 15, as the cost of the extra parts would be relatively low compared to the substantial cost of setting up to make them again in lots of 5 or less. In other words, we take a calculated risk with possible potential future requirement on the credit side, and the danger of increasing the inventory and incurring obsolescence on the debit side. Making 15 pieces instead of 5 obviously builds an inventory of "hard-to-move" parts, some of which may ultimately be scrapped. However, the total cost of the extra parts is more than recovered through sale of even a minor portion of them, since the special equipment profit was realized on the original 5 pieces.

Now let us talk about the actual detailed procedure of Scheduling and Planning for the diversified assembly line.

The final assembly schedule is released for a relatively brief period ahead. This will vary from a week to two weeks, based upon the Company involved. The minumum lead time is the production cycle required to produce the standard sub-assemblies. The actual assembly date of a specific order will be based on the availability of the key special components required on that order.

The balance of the material flows according to the dictates of the schedule. The final schedule as conceived will be detailed to the specific customers' orders involved. The very nature of the business makes this necessary, and, at the same time, limits the forward extension of the schedule to a relatively short period.

Sub-assembly schedules are developed from the final schedule. These, too, will be projected specifically for a relatively short

. . . *Continued on page 106*

5409

SHORT RUNS of PRECISION GEARS

Short runs of small, fine pitch, precision gears (gears up to 6" O.D. of the gear blank) carry high unit costs largely because of the top-heavy machine set-up time as compared to total production time. You can beat the machine set-up problem by routing small precision gear jobs to Hamilton Precision Gear Hobbers . . . for:

"Hamilton Precision Gear Hobbers feature independent selection of speed, feed, and indexing; reducing machine set-up time and offering a selection of cutting speeds and feeds to suit (exactly) the material being worked."

if you buy small quantities of precision gears, tell the man to "put your job on a Hamilton." You stand to profit two ways!

WANT FACTS?

Write for Hamilton Bulletin No. 5409. Address: The Hamilton Tool Company, 832 South Ninth Street, Hamilton, Ohio

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CIRCLE INFORM-A-GRAM KEY NO. 103

NUCLEAR POWER NO THREAT OF TECHNOLOGICAL UNEMPLOYMENT

The need for and the potentialities of nuclear power for tomorrow's Industry have become fairly well known. Because there has been at various times the mention of possible technological unemployment occasioned by nuclear power some attention should be given certain remarks of Henry D. Smyth, member of the Atomic Energy Commission, speaking before the recent Annual Conference of Business Economists.

According to Dr. Smyth, "Nuclear power plants differ from normal power plants only by substitution of a nuclear reaction for the firebox and boiler. The steam turbines will be essentially the same and so will the electric generators. The gradual introduction of nuclear power does not represent a new industry but merely the modification of a familiar one. The change consists in the substitution of a new fuel for an old one, but this must take place rather more slowly than the substitution of oil for coal in commercial power furnaces because a totally different type of furnace is required."

Dr. Smyth also pointed out that "The growth of nuclear power would occur in a period of general industrial expansion accompanied by a very rapidly rising demand for electric power . . . Since nuclear power will be a minor factor in a major expansion of power plants, the demand for other fuels in this period will increase rather than decrease."

"If predictions are approximately right," said Dr. Smyth, "nuclear power will play an important but not overwhelming role in our national power picture by 1975. The next 20 years will be a period of development and transition. Presumably, most of the power plants (conventional or nuclear) in the nation's electric supply network will continue to be privately owned."

The economic feature of nuclear power was said to rest on the solution of various technical problems. The Atomic Energy Commission recently announced a five-year technical program designed to find the answers to those problems that are known to exist. The compelling incentive to pursuance of this program is the fact that "the energy potentially available in the world's reserves of mineable uranium has been estimated as between 20 and 25 times the energy from world reserves of oil, gas and coal added together."

Aside from the economical advantages expected from nuclear power for certain isolated areas of this country and its territories, of possibly greater importance is the role that nuclear power may play in supporting American foreign policy — by assisting those countries now burdened by scarcity or absence of conventional power sources. Availability of power could possibly expand enormously the present foreign market for modern industrial equipment.

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CUT COSTS..
MOHAWK
SUBLAND
DRILLS

2 to 11 Operations
Simultaneously Accomplished

The Subland type taper roughing reamer eliminates more than 70% of the torque encountered with conventional type taper roughing reamers because it is a right-hand spiral, freely end cutting tool. This reduction of torque eliminates flute breakage and wedging which lengthens tool life by as much as ten times. At the same time, with a Subland, the job can be done two to five times faster, leaving a cleaner hole for the finishing reamer. Properly applied, a Subland can accomplish two to eleven operations at one time. Send part, print, tool layout, shank and over-all length requirements for prints and prices. Let Mohawk cut your production costs with properly applied Sublands.

Subland Taper Roughing Reamer (2-2-2-2-2-2) which works like a core drill to effectively rough your tapered hole.

SEE JULY ISSUE FOR ANOTHER NEW SUBLAND

Mohawk TOOLS, Inc.
910 E. MAIN ST., MONTPELIER, OHIO

worlds largest producer of Sublands

CIRCLE INFORM-A-GRAM KEY NO. 104

Russell J. O'Neil has been appointed a field engineer by the Norton Company of Worcester, Mass. He will be assigned to the firm's Detroit district office. O'Neil has been with Norton since 1945. He was a group leader at the Detroit office from 1947 to 1951. Then he became a supervisor at the Cleveland Office. A native of Canada, he served five years in the Royal Canadian Air Force during World War II. He emerged from the conflict with a Warrant Officers commission.

Russell J. O'Neil

◆

The appointment of **George Doig** as sales manager of Numatics Operating Valves, Milford, Mich., has been reported. Mr. Doig had previously been associated with the J. N. Fauver Co.

◆

Destiny Products Company of Detroit and Miami, recently announced the appointment of **Allen B. Doggett** as district manager covering the northern New York State region.

◆

George H. Follansbee is now a sales representative in Ohio for the steel products of the Follansbee Steel Corp. of Pittsburgh.

◆

Harold L. Heuser has been placed in charge of the sale of standardized conveyors in the Cleveland area for the Mathews Conveyor Company of Ellwood City, Pa.

◆

The Miller Fluid Power Company reports the addition of three new men to its ranks. **Richard M. Morgan,** who joined the organization in March, has been placed in charge of production tooling, production engineering and plant layout. **Dave Alexander** has been appointed as Miller's new salesman for the Philadelphia, Pa., area and **Wilfred A. Pehl** has been appointed field engineer for the Cleveland, Ohio territory.

◆

Robert Shoenhar has been named assistant manager of the Washington D. C., office of Air-Research Mfg. Co.

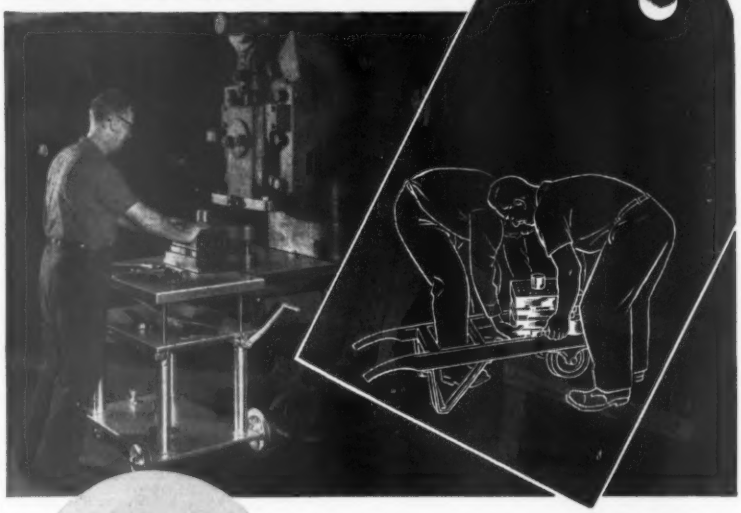
The management of the Pivot Punch and Die Corp. of North Tonawanda, N. Y., announces the appointment of **Clifford Canning** as sales engineer for Ohio, Indiana and Kentucky.

◆

The Hydraulic Press Mfg. Company of Mount Gilead, Ohio, announced the appointment of **Elton W. Turner** of East Detroit, Mich., and **Bruce H. Lowe** of Battle Creek, Mich., as sales engineers.

BRAWN

YOUR PRODUCT'S MOST EXPENSIVE FACTOR



Of all that contributes to the production of your product, labor is the most costly.

Of all that contributes to the reduction of costs, a simple mechanical means for handling compact, heavy loads is the least costly, easiest to install, most widely used by workers.

Complete information in FREE Bulletin No. P-5404. Write for it! Address The Hamilton Tool Company 832 South Ninth Street, Hamilton, Ohio

PORTELVATOR®

THE HANDY HAMILTON PORTABLE ELEVATING TABLE

FITS THAT NEED

Built standard to handle loads of 1000 to 5000 pounds, Portelvator features the original worm, worm gear, and screw principle of power transmission, plus *three* table surfaces, plus *four* point support.

Prices start at $155.00—Install a couple without delay, and watch results.

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CIRCLE INFORM-A-GRAM KEY NO. 105

. . . Human Element, from page 103

time and cannot go beyond the final assembly schedule. This does not necessarily mean that the various departments involved cannot have a good advance projection for total requirements, though not specific, so that departmental man-loads can be determined. The common components for the various sub-assemblies can be, and are planned and fabricated for stock on a regular and carefully thought-out program instituted in advance of customers' orders. The final assembly and sub-assembly schedules are tied together by a relatively simple procedure of paper work, plus the personal attention of Production Planning and Scheduling Supervision, and implemented by their representatives in the Manufacturing departments.

This is the essence of control that makes it possible to operate the final assembly line in a diversified factory without being plagued with an impossible number of material shortages. The same type of programming indicated for the end product producer must be followed in connection with the special components being purchased complete from vendors. Despite the fact that orders are placed well in advance of required delivery, the actual specific delivery schedule will vary within the required lead time of each supplier.

Most steps in the specialized phase of the Planning operation require a generous measure of human judgment augmented by available time-saving devices. As the "special" nature of the Planning function increases, the concept of "system" changes from one which rigidly outlines each step in the conversion of the customer's order to the production of the finished product, to one which encourages the exercise of discretion by the **people** involved in the system.

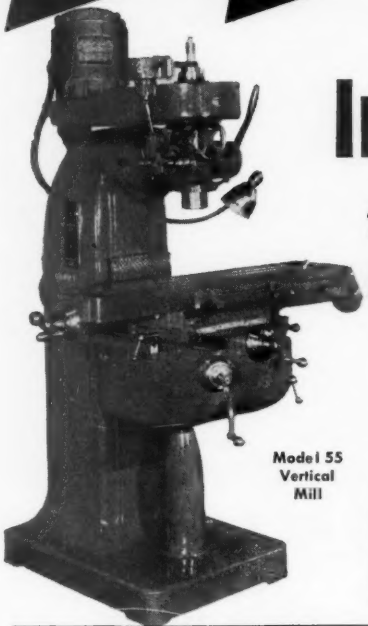
Very often it is necessary to circumvent or telescope the conventional Planning operations. For example, assignment of work to equipment in the many miscellaneous short-run machining departments is left to the discretion of the Foreman. The department is run from a Factory Work Order and tied to a production schedule by the departmental representative of the Production Control organization, the "Stockchaser".

You cannot dispense with person to person follow-up. The assembly date of the finished product is developed by an analysis of the material required and the time cycle of its manufacture. The flow of material to the assembly line is also controlled by the human element . . . again by working to the detailed schedule. Foremen and Stock Clerks, acting primarily on the basis of assembly schedules, plan on the basis of the foregoing and informally load each department's equipment to meet the schedule.

In order to obtain maximum flexibility, the Shop Engineering Departments likewise must think in terms of selecting machines, designing tools, and planning layouts to attain the same end. Even the so-called "standard" parts are not run in tremendous quantities to justify completely specialized equipment, such as used by passenger car manufacturers.

CAPACITY + PRECISION + ECONOMY +

Choose INDEX MILLS FOR THESE (+) PLUS ADVANTAGES



Model 55 Vertical Mill

You get more when you buy an Index Mill —more quality, superior features. You are not just buying a machine . . . You are investing in equipment that will deliver better results at lower cost. The ideal machines for all your

MILLING, BORING and DRILLING JOBS

Outstanding in this great line is this versatile MODEL 55 VERTICAL MILL, designed for those extra capacity jobs often found in tool and die shops; provides increased speed and feed range. Capacity ⅛" to 1½" end mills in steel, a table working surface of 32" x 9" or 38" x 9"; overall 40" x 9" or 46" x 9".

MODEL 40 VERTICAL MILL
For speedy, economical milling. Spindle gives 9 speeds, 125 RPM to 2250 RPM. Easy to operate. Rugged, for every day operation; also used for boring and locating. Capacity ⅛" to 1" end mills in tool steel. Table working surface 8" x 26", 8" x 34" overall.

MODEL 60 HORIZONTAL MILL
Simple, efficient, compact, with all operating parts enclosed, yet readily accessible. Unusually low-priced. Designed for the average tool room, yet highly suitable for production shops through its rigidity and low maintenance cost. Standard table 40" x 9", larger table optional.

INDEX BUILDS BETTER MILLS . . . WRITE FOR LITERATURE

INDEX MACHINE CO.

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CIRCLE INFORM-A-GRAM KEY NO. 106

Other departments, too, must be geared for flexibility to complete "to order" work in a minimum time. Perhaps we could simply say that much of the detailed planning and programming for the diversified assembly line must not only be planned by **people,** but performed by **people** instead of machines. People are then in reality the Catalyst, which makes it possible for the system to "react" or operate.

The Supervisors of the diversified factory must be thoroughly familiar with the problems of the other departments, see their problems, understand them, and make their decisions in light of other departments' problems because there is no time for delay. The manufacturing program is planned from week to week, rather than from season to season, or year to year.

While the diversified product manufacturer must have a formal organization chart like any other company, he depends far more on something you never see . . . the informal organization chart . . . that structure of human relationship which brings the schedule to realization through the teamwork of people. All of the team play is towards achievement of efficient production on a day to day, week to week basis within an over-all Management projection.

The most important factor in stimulating the proper attitude, enthusiasm, and efficiency of the people is the cultivation of a relaxed atmosphere to permit the development of individual imagination and initiative.

The executives **themselves** must recognize that the responsibility for promoting the relaxed atmosphere is from the higher echelon to the lower. The success of the executive will be determined by his ability to handle the various Supervisors reporting to him by adjusting his own approach to the man in question, thereby permitting his key assistants to work at their greatest efficiency in a relaxed atmosphere. This is a contagious attitude which soon works its way down through all levels.

Many of the important decisions in a diversified factory are best made by Supervisors, who have been taught independence of thought . . . a most important result of smooth and relaxed relations between Management levels. In short . . . let's have leadership . . . a Democracy rather than a Dictatorship.

You might say, "We already do exactly this", but **do** you? And, if so, how well? Are you objective in analyzing the effectiveness of your organization? Can you honestly say that you have given the men reporting to you an opportunity to develop themselves for their own good as well as for the Company by providing the proper understanding and atmosphere? I sincerely believe that this is the most important part of our subject at hand, and for that reason have titled this paper "The Human Element . . . . Catalyst in Proper Planning for a Diversified Assembly Operation." For indeed, it is the human element which brings all of the other elements together and carries the schedule to completion. It is the human element through which the objectives of good planning are achieved.

5407

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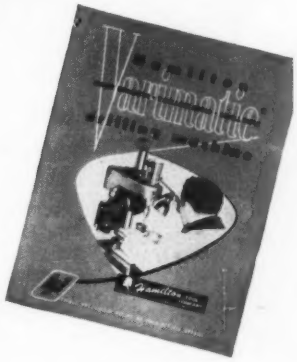
SUPER SENSITIVE
VARIABLE SPEED • SMALL HOLE
PRECISION
drilling machine

SINGLE OR
MULTIPLE SPINDLES

to drill holes (.004" to 5/16") in all drillable materials, to the most exacting specifications and on the most relentless production schedules.



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CIRCLE INFORM-A-GRAM KEY NO. 107

COST CUTTING MAY REQUIRE "SHOCK TREATMENT"

"Shock treatment" is sometimes necessary to cut costs by breaking up complacency in various echelons of management, Warren C. MacFarlane, president and general manager of Minneapolis-Moline Company, told the recent national manufacturing conference of the American Management Association. His remarks were directed at production executives from all parts of the U. S. attending the three-day conference.

Farm equipment manufacture has required a recent period of careful examination of cost controls, according to MacFarlane. "Just as necessary as the police siren in traffic has been a stern 'STOP' to apparently insignificant items of expenditure that have mushroomed during the sellers' market. A multitude of little things add up to big costs."

Like a motorist consulting a road map, management must occasionally "pull over to the side of the road," he asserted, "to see where it is going. Big things are easy to see, but it takes patience and long perseverance to keep after the little things. Anybody can see a break in a water main when it blows the pavement ten feet in the air, but it takes discerning management to detect the little leaks that can undermine your business. Even a one dollar bill is gross profit—if you don't spend it unnecessarily."

Keeping an organization properly advised as to company objectives and current progress builds morale and helps get things done on time, MacFarlane maintained. "Meetings with groups of top executives are taken for granted. But it is also essential that even lower ranks in management be invited to conferences for frank and thorough discussion of problems."

Quality control, MacFarlane indicated, is an absolute "must" in today's manufacturing. Close to quality is customer convenience and user comfort—especially in products such as his own company makes. The same attention to worker comfort and safety is given by management in MM plants and offices. Safety is not only humane, it pays. Auxiliary air cylinders, controls actuated by the foot, hydraulic and electric lifting machines for heavy parts and loads, indexing devices, all increase worker satisfaction and production, and thereby cut costs. "An exhausted worker is not an efficient worker," MacFarlane declared, "and our plants are constantly studied for easier and safer ways to do work."

"I am not talking about officious attention to a thousand details of what might be called 'picayune pecking' at insignificant minutiae," MacFarlane concluded, "But waste in any amount is criminal in free enterprise because it may so endanger us as to bring 'statism' with all its open and hidden evils. We need both close attention to detail and the long, broad view that is sometimes called 'vision.'"

When you "SAVE"...
YOU LOSE!
"Saving" by making your own punches is old-fashioned and expensive.
Here's why:
1. PORTER PUNCHES are available for immediate delivery.
..... they save time — money — by keeping your expensive help at profitable jobs.
2. PORTER PUNCHES are made to "stand the gaff."
..... punches made in your shop are probably made from "available" material ... often the wrong metal for the job.
3. PORTER PUNCHES are offered in standard—and decimal sizes.
..... so your experienced help doesn't spend costly time "whittling."
4. PORTER PUNCHES are reasonably priced.
..... only a "specialist" can make punches as well—or as inexpensively.
Check your labor costs — your "down-time"— and order
PORTER PUNCHES
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Save time — save money — with top quality punches and die buttons.
Look to Porter for
the punch you need... when you need it!
Remember — you don't save by making your own punches — you lose.
"Still the best performer"
PORTER PRECISION PRODUCTS
Cincinnati 15, Ohio
Porter Punches are in stock in all principal cities.
CIRCLE INFORM-A-GRAM KEY NO. 108

OPERATION 'POWER' OR, HOW TO MACHINE A 5-LETTER WORD

THE JOB: Machine the word "POWER" to accurate dimensions in ¼" die steel (fully hardened and ground) for a die casting trim die using the Elox process of electrical discharge machining.

The electrode or cutting tool was made from free machining yellow brass on a duplicating machine. The brass form was soldered to a brass header and the holding stem fastened to the top and center of the header. Coolant holes were drilled as shown in photograph 1, and manifolded in the header plate.

Fig. 1. Top: Electrode
Bottom: Die Cast Pattern

Also shown in photograph 1, is the die cast pattern that the electrode was made from.

The procedure was standard for the Elox M-400 electrical discharge machine . . . the work fastened to a bolster plate in the coolant retainer tank. The electrode was chucked in a ½" collet and the two checked for accurate horizontal alignment. The machine controls were then set for

Fig. 2. Finish Trim Die

"coarse" cutting with medium speed on the automatic feed. Coolant pressure was maintained at 40 psi.

The word "Power" was machined in a simple pass and the only change in technique was to set the controls to "fine" for cleanup after break-through. The complete job took 12 hours; with machining time for the electrode consuming 8 hours and the trim die, see Figure 2, took up the rest of the time.

This same job machined by orthodox methods would require no less than 40 hours and would have to be made in a number of accurately machined segments. With the Elox method, actual die machining was push-button operated with no operator attention required.

NEW DISTRIBUTOR

The Rotor Tool Company of Cleveland, manufacturer of pneumatic and high cycle electric tools announced that the Big Three Welding Equipment Co. will distribute Rotor products in Texas, Oklahoma and New Mexico.

Big Three maintains twenty-one offices in the three states and will maintain stocks of tools and parts for its customers.

Morton MACHINE WORKS
MORTON MACHINE WORKS
Where fine Fixture Clamps and Fixture Details are manufactured. Remember, MORTON stands back of their own products.
THERE IS A MORTON FIXTURE
CLAMP AND FIXTURE COMPONENT TO MEET YOUR MOST EXACTING REQUIREMENTS. ECONOMIZE . . . USE THEM AS STANDARDS. IMMEDIATE DELIVERY.
Morton
WRITE TODAY
For our 72-page illustrated Catalog showing Morton's complete line and including full size templates of each product for tracing purposes.
MORTON MACHINE WORKS
2421 WOLCOTT DETROIT 20, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 109

CUTTING FACTORY COSTS WITH PERMANENT MAGNETS

Cutting costs is just one of the many benefits made possible by magnets in today's modern factories. The author discusses the benefits derived from the use of magnets in tooling, processing, materials handling, and as production aids.

By Gerald P. Troy
The Indiana Steel Products Company
Valparaiso, Indiana

Costs are paramount today. Every manufacturer has a staff of men investigating methods for reducing his expenditures. People are talking, reading, and writing about new ways—including completely automatic plants—to produce more for less money without sacrificing quality.

Hand labor is slow and is becoming more and more costly. Oftentimes it is a brake on other operations. Similarly, for certain operations, mechanical stops, clamps, rollers and belt conveyors may be slow. In other cases, the material is not always under control, or it is subject to damage.

Magnets can help increase production, reduce down time, use labor to better advantage, increase efficiency, cut operating costs, make operations safer, and move material faster, cheaper and more efficiently.

It seems timely to us therefore to call your attention to the role that permanent magnets can play for you. The magnetic items discussed are not somebody's dream. They are real products, manufactured by our customers, and they have proved their value many times on production lines.

Magnetic Conveyors Replace Hooks, Clamps

Magnets are replacing hooks and clamps in many operations, especially where the part does not contain a hole or where a clamp might damage the finish.

Cans, tools, cutlery, metal bottles and other parts are being carried magnetically from one operation to another, from one department to another, or through plating tanks, paint dip tanks, or electrostatic painting hoods. It is interesting to watch operators on these lines, for they seldom even look at the conveyor when removing or mounting parts on the magnetic elements.

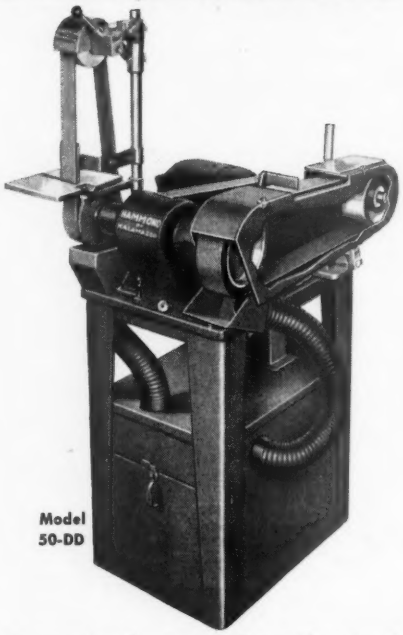
Magnetic elevators also carry parts to storage bins and drop them off. Magnets used on sheet-steel classifier conveyors hold the sheets down and keep them under control. Magnetic rolls, pulleys and drums are handling pipes, plates, sheeting, tubing and similar parts.

If you would like better performance from your conveyor lines, or your conveyor assembly lacks something, perhaps permanent magnets will do the job.

Increase Versatility of Visual Systems

Visual systems—which utilize charts, graphs, bulletin boards, maps, and factory and office layouts — are being used for such varied purposes as production scheduling; inventory control;

Hammond of KALAMAZOO
FOR
DEBURRING



Model 50-DD

IRREGULAR SHAPES

FLAT WORK

CONTACT WHEEL

CONTOURED PARTS

HARD-TO-GET AREAS

It is amazing how soon these Abrasive Belt Machines pay for themselves.
11 combinations available with or without Duskolector.

"Clip" this ad to your letterhead. 20 page catalog will be sent at once.

Hammond Machinery Builders INC
1631 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 110

production control; order, purchase and sales tabulations; organization charts; demonstrations; budgeting; and quotas.

Perhaps, however, they are not being used as much as they should be, because most of the old types were inflexible, difficult to modify or change as conditions changed, one-shot propositions and, consequently, costly to maintain and operate.

Magnets are removing many of these objectional features. There are magnetic templates, scaled machines and scaled office equipment. With a steel background, these items are immediately spotted or moved. And, because the magnetic part will remain in place until forcibly changed, any given system can be moved without fear of upsetting the arrangement.

Permit Faster, Easier Material Processing

Magnetic devices pick up raw material and parts from bins, conveyors, hoppers, etc., and systematically feed them into automatic machinery. They permit the alignment of raw material and parts before entering a machine, and position them properly for processing by the machine.

Magnetic stops on metal-working machines assure that the part is far enough into the machine before it is tripped. Magnetic rolls, pulleys and drums feed and remove large and small sheets, pipes, tubing and other parts. Hold-down magnets and positioning magnets control parts during processing. Other magnets orient parts just before they enter a machine.

Magnets separate and fan out individual metallic sheets so that each can be picked up easily and quickly. Such separators can handle sheets up to ¼ inch thick. Magnetic hand-lifters are also available which grasp parts and feed them into machines, as well as remove them. Release is accomplished by a simple release mechanism.

Parts may have to travel at high speed along a conveyor and then be slowed down just as they enter a machine. Magnets are providing that braking action as, and when, needed. If it is necessary to keep raw material under tension while in processing, magnets at the spool provide the necessary braking action.

On some machines, numerous magnetic fingers pick up parts from a bin, conveyor or hopper, carry them into the machine, hold them during processing, and then release them at a stripping point. One battery of six machines required six operators. With these magnetic fingers, only one operator was required, and the output per machine was greatly increased.

Magnetic Hand Tools Do Job Better, Faster

Magnetic screwdrivers, nut holders, wrenches and bit holders accelerate both hand and machine operations. They are especially valuable where the screw or the nut must be fastened into an almost inaccessible place in a machine, or where frequent changes are necessary.

Magnetic bases used for mounting such things as height gauges, roundness gauges, indicators and magnifiers on machines provide easy and inexpensive setups. And, they eliminate the possibility of damage to such instruments by preventing them

. . . *Continued on page 126*

WESPO

TOGGLE CLAMPS

Note These Improved Features:

1. REAMED HOLES—for better bearing
2. HARDENED BUSHINGS—Serrated to prevent turning
3. HIGH TENSILE STRENGTH RIVETS—for longer service.

Corrosion resistant black oxydized finish.

A Clamp For Every Work Holding Need

35 SIZES AVAILABLE

WESPO TOGGLE CLAMPS are engineered and constructed for positive holding and light, medium and heavy clamping.

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CIRCLE INFORM-A-GRAM KEY NO. 111

Keep Informed • CATALOGS BULLETINS • SPECIFICATIONS

PUBLICATION

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

Die Filer. The Rice Pump & Machine Co., Belgium, Wis., offers an illustrated bulletin on a machine that performs all sawing, filing, and lapping operations with speed and accuracy reportedly at a remarkably low cost.
Circle Inform-A-Gram No. B1.

Heat Treated Threading Heads. This revised bulletin (No. F-90-2) includes detailed data on all Landis heat treated heads, both standard and special. All die heads are illustrated and complete specifications are given. Write to Landis Machine Co., Waynesboro, Pa., or—
Circle Inform-A-Gram No. B2.

Instruments & Controllers for heat treating furnaces made by the Hays Corp., Michigan City, Ind., are listed to indicate their broad applications in a catalog offered by the firm. Schematic drawings included, illustrate some of the more common uses of the instruments and controllers.
Circle Inform-A-Gram No. B3.

Projector-Comparator. The New Portman Model OFG-200 optical form grinder projector-comparator is said to be the first dual purpose instrument of its kind. How it operates and unique applications are discussed in an illustrated brochure that is yours for the asking from Portman Instrument, Inc., Town Dock Rd., New Rochelle, N. Y.
Circle Inform-A-Gram No. B4.

Boring Tools. This publication illustrates and describes "Block Type" boring tools. These tools eliminate the need of cutter adjustment; readily maintain tolerances of 0.001" on the face spacing as well as diameter; are interchangeable both as to size and arrangement; and reduce the overall cost of boring. The booklet is available from the Lehmann Boring Tool Co., 4389 Duncan Ave., St. Louis 10, Mo.
Circle Inform-A-Gram No. B5.

Variable Speed Polishing Lathe. Better and more uniform finish is the big reason why variable speed polishing is coming into its own. And Hammond's variable speed polishing lathes keep peripheral speed constant. You simply turn a handy speed indicator dial to keep the rpm at a desired speed. You can read all about this versatile machine in a bulletin available from Hammond Machinery Builders, Inc., Kalamazoo, Mich. If writing direct to the company, ask for Bulletin No. 635.
Circle Inform-A-Gram No. B6.

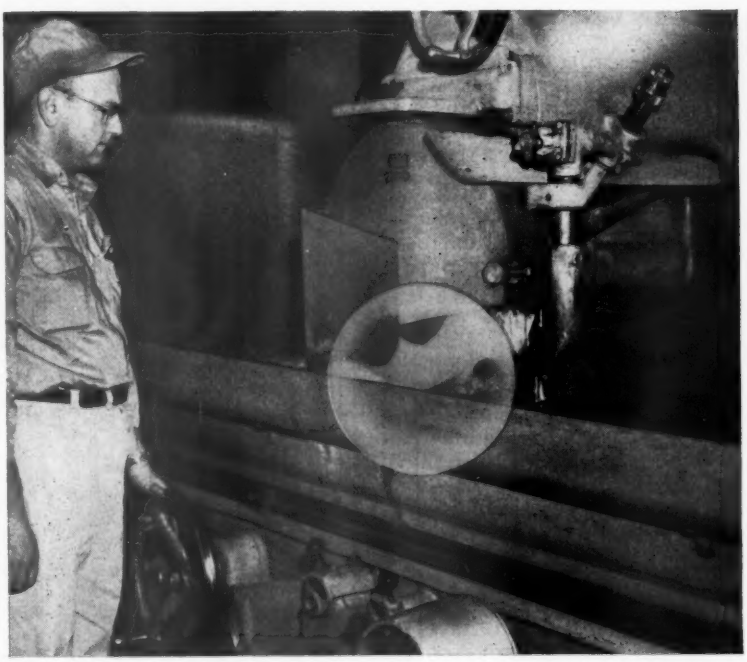
Power Transmission Equipment. Design and construction of Lovejoy variable speed pulleys, belts, V-belt sheaves, tilting motor and standard adjustable bases, countershaft bases, transmissions and other power transmission equipment are described in a brochure available from the Lovejoy Flexible Coupling Co., 4819 W. Lake St., Chicago 44, Ill.
Circle Inform-A-Gram No. B7.

Punching Tools & Dies. Descriptive information and technical data on standard and special punches, dies, coupling nuts, sleeves, punch stems, rivet sets, pistons, chisel blanks, pins, markers and shear blades is contained in Catalog No. 12 available from the Cleveland Punch and Shear Works Co., Cleveland 14, Ohio.
Circle Inform-A-Gram No. B8.

These users say:

For surface grinding, the new G BOND beats them all!

Latest Norton wheels bring you the money-saving "TOUCH of GOLD"



"We're getting forty per cent more wheel life from G Bond wheels, and they cost us twelve per cent less because now we don't need a premium priced abrasive. The new bond has proved excellent for grinding our laminated stainless steel and mild steel magnetic chuck plates." This from a Michigan manufacturer.

CIRCLE INFORM-A-GRAM KEY NO. 112

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

Thread Rolling Heads, suited to all horizontal or vertical machines and designed to roll all parallel thread forms in production to specifications — at speeds equal to high speed steel turning speeds for the same material, are illustrated and described in literature that can be obtained from the National Acme Co., 170 E. 131st St., Cleveland 8.
Circle Inform-A-Gram No. B9.

Sand Screen, a new non-clogging open-mesh abrasive material, designed especially for sanding operations where loading or glazing is a problem, is now in full production and is commercially available in a wide variety of shapes and sizes. Complete details are contained in a brochure put out by the Carborundum Co., Niagara Falls, N. Y.
Circle Inform-A-Gram No. B10.

"I get a fast cut and good finish. They're the best and most versatile segments I ever used for this kind of work and I'm re-ordering ten sets," reports an Illinois customer using G Bond segments for surface grinding mild steel, cast iron and Meehanite — all three.

Naturally, we've kept close watch on how the new G Bond wheels are doing. And we can report that throughout the range of precision and semi-precision grinding applications they're already away out in front. In the field of surface grinding, for instance, a composite statement by users of the new G Bond would run very much like this:

"G Bond wheels cut freer, cooler, faster — enabling us to take heavier cuts in costly high speed steels without drawing temper. They give us closer tolerances and smoother finishes. They dress easier and produce more pieces per dressing. Doing more work and a greater variety of work — per wheel, they outlast any wheels we ever used before."

G Bond Wheels for YOUR Surface Grinding

will bring new speed and economy to surface grinding jobs — thanks to their unique grain-holding structure that produces greatly improved cutting action. Remember, the G Bond is the most modern, most efficient vitrified bond ever developed — a typical Norton "Touch of Gold" achievement that steps up grinding performance and product quality while cutting grinding costs.

See Your Norton Distributor

for the ALUNDUM G Bond wheels, cylinders and segments you need. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Inc., Worcester 6, Massachusetts. W-1536

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ABRASIVES
Making better products... to make other products better

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CIRCLE INFORM-A-GRAM KEY NO. 112

An Improved Self-Loading Reel is featured in literature now available from the F. J. Littell Machine Co., 4127 Ravenswood Ave., Chicago 13, Ill. This reel has been designed to enable a girl to load a 250-lb coil wire without any assistance.
Circle Inform-A-Gram No. B11.

Iron Hand Automatic Unloading Machine for presses are illustrated and described in a brochure offered by the Sahlin Engineering Co., P. O. Box 289, Birmingham, Mich. Swinging arm and floor-type machines are covered as are six designs of special purpose jaws.
Circle Inform-A-Gram No. B12.

Photoelectric Controls. Labor saving, cost reduction and production increases are obtained through the use of Photoelectric Controls. A bulletin giving features, specifications and application data of these controls is available from the Autotron Co., Box 772-Q, Danville, Ill.
Circle Inform-A-Gram No. B13.

The Intermediate Two-Lens Quartz Spectrograph, an instrument suitable for production control work with nonferrous alloys, is illustrated and described in Bulletin 189-53. This literature is offered by The Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago 14, Ill.
Circle Inform-A-Gram No. B14.

Metallurgical Furnaces. A new illustrated brochure, describing the Rust Furnace Company's services to industry as designer-constructor of all types of fuel-fired furnaces in the melting, reheating and heat treating fields, is now available from the Rust Furnace Co., Rust Bldg., 575 Sixth Ave., Pittsburgh 19, Pa.
Circle Inform-A-Gram No. B15.

Optical gaging provides a visual means of comparing simultaneously the enlarged shadows of a shaft and of a transparent measuring scale. Shaft inspection by the optical gaging method is explained in a brochure being offered by Optical Gaging Products, Inc., 26 Forbes St., Rochester 11, N. Y.
Circle Inform-A-Gram No. B16.

New Center Catalog. Complete information on the new Red-E turret lathe center as well as the complete line of Bull and Pipe nose type centers, is furnished in the recently published catalog of the Ready Tool Co., 554 Iranistan Ave., Bridgeport, Conn. Specifications and prices are included.
Circle Inform-A-Gram No. B17.

Rust Prevention. A new, modern proven method of rust prevention, Vapor Phase Inhibitor, is explained in a brochure offered by Robert J. Kerr Chemicals, Inc., P. O. Box 443, Park Ridge, Ill.
Circle Inform-A-Gram No. B18.

Set Screws. A discussion of the locking and holding ability of "Allenpoint" cup point set screws is contained in a brochure available from the Allen Mfg. Co., Hartford 2, Conn. Charts that give tabulated data also are included in the publication.
Circle Inform-A-Gram No. B19.

Polishing Dies. A booklet describing and illustrating the most common methods and applications of polishing and finishing work with diamonds has been prepared by the Abrasive Div., Elgin National Watch Co., Elgin, Ill.
Circle Inform-A-Gram No. B20.

Tapping Equipment. Procunier drill press tapping equipment such as attachments, chucks and holders are discussed in literature now available from the Procunier Safety Chuck Co., 18 S. Clinton St., Chicago 6, Ill.
Circle Inform-A-Gram No. B21.

clocked at 5800%

PIVOT HIGH SPEED STEEL PUNCHES
STRAIGHTGROUND • WHIPSLEEVED

INCREASE PRODUCTION AT ERA TOOL AND MFG. CO. *MORE THAN 65 TIMES!*

Mr. Ervin Lonze (left), President, and Mr. Kenneth Rolin (right), Chief Tool Engineer of Era Tool and Mfg. Co., of Franklin Park, Illinois, experts in precision parts production, say: "We built another die, using Pivot Straightground Punches, to produce tuner chassis. Short runs over a period of 18 months have totaled 125,000 parts and the die has not been in the die repair department once. "It is easy to understand why we have standardized on Pivot Straightground Punches and why we now are building better dies for less."

Three of the eleven holes to be perforated in .042, ¾-hard, clock brass were to be .019, .023 and .027 — holding .0004 tolerance with 125 micro finish or better. That's a tough job — and production with the original die and ordinary punches, using the quill or point guide principle, was 15 to 600 pieces per set-up.

Then the die was equipped with Pivot Straightground Whipsleeved Punches. Production immediately averaged 40,000 — **with no rejects** — without breaking a single punch!

You, too, can gain the advantages of greater concentricity, accuracy, power and longer punch life, at minimum maintenance cost. Put Pivot Punches to work for you NOW.

SEND FOR FREE CATALOG AND STANDARD PRICES. WRITE DEPT. T.P.

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pivot punch and die corp.
NORTH TONAWANDA, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 114

Stub Reamers are illustrated and described in Bulletin 15 available from the 20th Century Mfg. Co., Libertyville, Ill. Discussed are Supeream stub reamers in decimal sizes.
Circle Inform-A-Gram No. B22.

The Morrison Keyseater cuts keyways from 1/16" to 1" with maximum length of cut of 8½". Illustrated literature on this machine is available from The D. C. Morrison Co., P. O. Box 1017, Cincinnati 1, Ohio.
Circle Inform-A-Gram No. B23.

Automatic Precision Balancing by metal removal using Motch & Merryweather automatic milling machines is explained in an illustrated bulletin available from the Motch & Merryweather Machinery Co., Penton Bldg., Cleveland 13, Ohio.
Circle Inform-A-Gram No. B24.

Advance Cross-Slide Rotary Table cuts set-up time on radii and angle milling; fits most vertical milling machines; is precision-built throughout; and is of low cost. Read all about this unit in literature that is yours for the asking from Advance Products, Benton Harbor, Mich.
Circle Inform-A-Gram No. B25.

A New Electro-Polishing Concentrate known as Electro-Glo 200", which operates at room temperature, has been introduced by the Electro-Glo Co., 1430 S. Talman Ave., Chicago, Ill. The process is designed to level the surface, remove high spots and burrs and produce finishes from satin to mirror-bright on copper and copper alloys. A pocket-sized brochure available from the company tells all.
Circle Inform-A-Gram No. B26.

Geargrind Machines. The availability of this catalog has been announced by the Gear Grinding Machine Co., 3901 Christopher, Detroit 11, Mich. It provides complete information on the entire line of machines as well as types and specifications.
Circle Inform-A-Gram No. B27.

A New 88-Page Silent Chain Book, containing detailed engineering data has been published by the Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill. This book, No. 2425, also lists pre-engineered stock drives while

another section outlines the procedure for selecting completely engineered drives. Complete operational and technical data, such as installation, maintenance and lubrication procedures, are contained.
Circle Inform-A-Gram No. B28.

Precision Static Balancing Machines for balancing flywheels, clutches, impellers, fans, pumps, brake drums, "V" pulleys and many other rotating parts are described in a new reference manual, "Practical Guide to Production Balancing". This booklet is offered by the Micropoise Engineering & Sales Co., 14851 Grand River Ave., Detroit 27, Mich.
Circle Inform-A-Gram No. B29.

Better Fastening. Complete data on physical characteristics of alloy steel screws are contained in a 36-page catalog just published by the Mac-it Parts Co., Lancaster, Pa. Included in the booklet are American Standards Association dimension standards plus a chart on the specifications of the various point styles of hollow set screws. An illustrated index shows the complete Mac-it line at a glance and tells where to find specific information.
Circle Inform-A-Gram No. B30.

Magnetic Contractors. Complete information on magnetic contractors, including dimensions and weights, are contained in Bulletin 502 available from the Federal Electric Products Co., 50 Paris St., Newark 5, N. J. The contractors covered in the brochure are designed to provide a safe, dependable means for repeated quick closing and opening of the electrical circuits controlling the sequence of operations in modern multiple action machines.
Circle Inform-A-Gram No. B31.

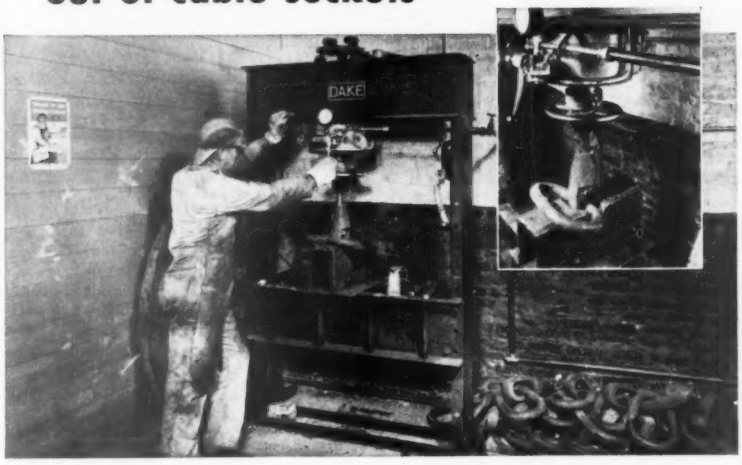
A New Pinch Type Chuck and Face Plate Jaw is described in literature now available from the Cushman Chuck Co., Hartford, Conn.
Circle Inform-A-Gram No. B32.

Jigs & Fixtures. To acquaint and familiarize potential users with its products, Manufacturers Engineering Service, Inc., Security Bldg., Toledo, Ohio, has a booklet on its semi-automatic drill jigs and milling fixtures. The publication gives specifications and prices and describes the company's "Try-It-Before-You-Buy-It" plan.
Circle Inform-A-Gram No. B33.

The New Brookfield Tool Holder with adjustable V jaw, axially true design and balanced pressure locking is illustrated and described in a brochure available from Brookfield, Inc., Stoughton, Mass.
Circle Inform-A-Gram No. B34.

Job Lapping Facilities. New and enlarged high production facilities have been installed at the Crane Packing Company's Grove, Ill., plant. For further information write for illustrated booklet No. L-407, Crane Packing Co., Dept. TPC, 1800 Cuyler Ave., Chicago 13, Ill., or—
Circle Inform-A-Gram No. B35.

A DAKE PRESS replaces the "*hernia method*" of driving plugs out of cable sockets



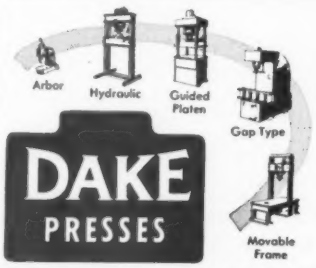
A concern that supplies cable slings for steel mills re-uses the closed-type sockets after driving out the cable-and-solder plugs.

Knocking them out was formerly a "brutal" job for two men. One held a driving pin, while the other swung powerful blows with a sledge. Working full time, they couldn't keep up with production requirements, and it was difficult to keep men for such hard manual labor.

Today, one man handles the entire job easily with a Dake Press, in 16 to 20 hours a week. Labor cost is less than 25%, and workers are mighty glad that the rugged hand sledging days are over.

Are you using Dake Presses for the hard jobs in your shop? Dake Catalog 129 shows many standard arbor and hydraulic presses . . . or, if you have a special problem, Dake can custom engineer a press to your particular needs. Why not ask?

Dake Engine Company, 634 Seventh St., Grand Haven, Mich.



Send for Big New Catalog

DAKE ENGINE COMPANY
634 Seventh St., Grand Haven, Mich.
Please send me a copy of Dake Catalog No. 129
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Company_____
Address_____
City_____ Zone____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 115

How You Can Reduce Production Costs with Aldridge soluble oils and other cutting and grinding fluids is the subject of a booklet available from Aldridge Industrial Oils, Inc., 3401 W. 140th St., Cleveland 11, Ohio.
Circle Inform-A-Gram No. B36.

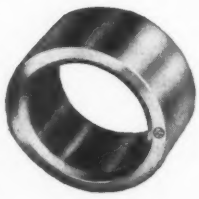
Precision Gages. A reference file folder for filing precision gage data is available from the Amco Gage Co., 19760 W. 8 Mile Rd., Detroit 19, Mich. The folder is illustrated and shows seven types of precision gages and holding fixtures manufactured by the company.
Circle Inform-A-Gram No. B37.

The Duff Vertical Milling Machine with universal head is described in a brochure available upon request from the Duff Machine Co., 31 Wingate St., Haverhill, Mass. Illustrations and specifications included.
Circle Inform-A-Gram No. B38.

Flexible Metal Hose. Seamless monel and nickel flexible hose are described in Catalog No. 100 issued by the Cobra Metal Hose Div., DK Mfg. Co., 4640 W. 54th St., Chicago 32, Ill. Also discussed are stainless steel, bronze and steel hose. Application data and specifications point the way through a wide range of materials and sizes.
Circle Inform-A-Gram No. B39.

Do Your Bushings do a 100% Job
Right from the Start?

Unless they are hard right out to the surface, *the answer probably is "NO!"*



"Soft skin" may be her pride and joy—but "soft skin" in bushings is strictly persona non grata.

A•B•C Drill Jig Bushings are hardened and quenched by a process which uses an atmosphere of endothermic hydrogen gas. This means there is no "soft skin" and every A•B•C Bushing delivers a 100% job *right from the start.*

A further feature of A•B•C Bushings is that same fine metallurgical care that goes into A•B•C Precision components for Diesel and aviation engines, and into A•B•C Precision Piercing Punches.

All this, plus careful workmanship and exacting inspection, guarantees unexcelled dimensional accuracy, more holes drilled per hour and lower cost per hole.

The finer accuracy, economy and long life of A•B•C Bushings have made them preferred where highest engineering standards must be met.

Write for price list — and catalog which includes information of value to every person who uses or orders industrial tools.

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Main Office & Factory—433 North Ave., GARWOOD, N. J.
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ENGINEERING OFFICE & REGIONAL WAREHOUSE
5722 W. Chicago Ave., CHICAGO 51, Ill., *ESterbrook 8-7180*
Representatives in major industrial centers

CIRCLE INFORM-A-GRAM KEY NO. 116

Stainless Steel Fastenings, all types, are illustrated and described in a catalog available from the Star Stainless Screw Co., 190 Union Ave., Paterson 2, N. J.
Circle Inform-A-Gram No. B40.

Screw Machine Tools made by the Boyar-Schultz Corp., 2110 Walnut St., Chicago 12, Ill., are illustrated and described in a catalog available from the company. Included in the brochure are drawings and specifications.
Circle Inform-A-Gram No. B41.

Dial Indicators with the revolutionary new Nilcoid movements and pointer-line dials are illustrated and described in a bulletin available from the Nilsson Gage Co., Inc., 245 Mansion St., Poughkeepsie, N. Y. Among the highlights of this comprehensive bulletin (#254) is complete data on the Nilcoid movement—an engineering simplification that contains only four moving parts and completely eliminates both the conventional gear train and the resultant inaccuracy and wear.
Circle Inform-A-Gram No. B42.

Electro Arc Metal Disintegrators for piercing holes in metals and removing broken tools in toolrooms, job shops and production departments, are discussed in an illustrated bulletin now available from the Electro Arc Mfg. Co., P. O. Box 448, Ann Arbor, Mich. The bulletin (541) describes the disintegrators' operating features and shows 15 typical jobs performed.
Circle Inform-A-Gram No. B43.

Vises. This new General Catalog #110 describes many types of vises, clamps and positioning devices. It has just been released by the Wilton Tool Mfg. Co., Dept. CR, 941 Wrightwood Ave., Chicago 14, Ill.
Circle Inform-A-Gram No. B44.

New End Mill Catalog. This literature covers Melin's complete line of end Mills (including three flutes), router bits, countersinks, counterbores, corner rounding tools, live centers and special tools. The catalog is available from Melin Tool Co., Inc., 3371 W. 140th St., Cleveland 11, Ohio.

Circle Inform-A-Gram No. B45.

Tap Chamfer Grinder. New descriptive literature issued by the Edward Blake Co., 437 Cherry St., W. Newton 65, Mass., is illustrated with close-up photos of the company's tap chamfer grinders, Models 1 and 2. Designed for operation in any shop where taps are used, the Blake machines are ruggedly built self-contained units independent of any other machines in the shop.
Circle Inform-A-Gram No. B46.

Stainless Steel Bulletin. Three groups of stainless steels, Martensitic, Ferritic and Austentic, are discussed in a bulletin offered by the Waukesha Foundry Co., Waukesha, Wis. The brochure also carries data on stainless steel castings, tensile requirements at room temperatures and a stainless steel recommendation chart.
Circle Inform-A-Gram No. B47.

Series 200 Morse Cam Clutches for indexing, overrunning and backstop machine drive applications are described in a catalog put out by the Morse Chain Co., 7601 Central Ave., Detroit 10, Mich.
Circle Inform-A-Gram No. B48.

Drill Jig Bushings. To combine the best features of steel and carbide, without the disadvantage of either, the W. F. Meyers Co., Inc., Bedford, Ind., recommends its carbide insert drill jig bushing, made to ASA standards in headless press fit, head press fit and slip and fixed renewable types. A catalog is available explaining all.
Circle Inform-A-Gram No. B 49.

The Benchevator, a new materials handling device that speeds work on anything handled in stacks or sheets, is described in Bulletin No. 14, just issued by Rodney Hunt Machine Co., Orange, Mass.
Circle Inform-A-Gram No. B50.

Bore Profile Gage. This instrument was developed by the British Iron and Steel Research Association for the measurement of bores and profiles of wire-drawing dies. Bulletin No. CT 66 explains all and is available from the Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. **Circle Inform-A-Gram No. B51.**

Giant Bolts. A new line of giant Unbrako cap screws of heat-treated alloy steel are discussed in a folder prepared by the Standard Pressed Steel Co., Jenkintown, Pa.
Circle Inform-A-Gram No. B52.

Improved 10" Lathes are illustrated and described in literature available from the South Bend Lathe Works, 425 E. Madison St., South Bend, Ind. Among the improvements mentioned are 24 spindle speeds, new micrometer dials, new machine handles and new gear boxes.
Circle Inform-A-Gram No. B53.

NEW! ROTOR AIR GRINDERS

LIGHTER!
MORE POWER!

Rotor "D-6"... the new, lightweight (9¼ lbs.) tool for heavy-duty work

Rotor "D-8"... all the power you can use and weighs only 12¼ lbs.

SPECIFICATIONS

	RPM	WEIGHT*	LENGTH†	WHEEL SIZE
D-6	6000 4500 4100	9¼ lbs.	22¼"	6" elastic 8" elastic 8" elastic
D-8	6000 4500 4100	12¼ lbs.	21⅜"	6" elastic 8" elastic 8" elastic

*For straight handle. For grip handle add ¾ lbs.
†Deduct 1⅛" for grip handle.

ASK FOR BULLETINS NO. 45 and NO. 46

AIR HIGH CYCLE

THE ROTOR TOOL CO.
CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

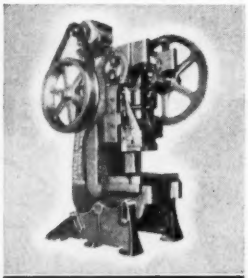
CIRCLE INFORM-A-GRAM KEY NO. 117

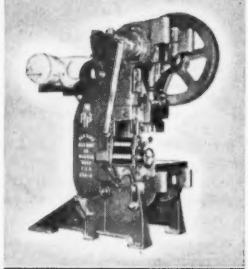
Drill Bushings. Three Revere drill bushings; die cast body for casting and light steel jobs; the fixed bushing; and the Pop Fit bushing are illustrated and described in a bulletin put out by the Revere Fisher Engineering Co., North Branch, Mich.
Circle Inform-A-Gram No. B54.

New Hard-Facing Alloys. Three new cobalt-chromium-tungsten hardfacing alloys in welding form have been announced by Crobal, Inc., 2800 S. State St., Ann Arbor, Mich. Full details and applications are given in Crobalite Bulletin 102.
Circle Inform-A-Gram No. B55.

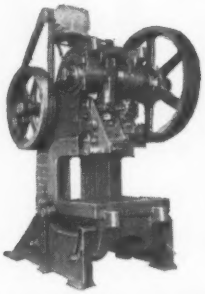
Accessories & Components for tool rooms and machine designers are illustrated and described in a new 52-page catalog offered by the Reid Tool Supply Co., 332 W. Delano Ave., Muskegon Heights, Mich.
Circle Inform-A-Gram No. B56.

Precision Investment Casting is a process by which intricate metal parts may be reproduced. The advantages in comparison with conventional methods of production, the technique, and the equipment and supplies are discussed in a booklet available from Alexander Saunders & Co., 95 Bedford St., New York 14.
Circle Inform-A-Gram No. B57.

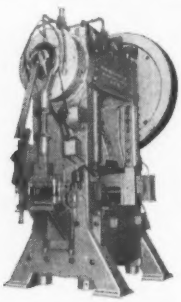

#700 B GEAR PRESS


650-B PLAIN FLY WHEEL

No. 10M FLYWHEEL PRESS


No. 800B GEARED INCLINABLE PRESS

Illustrating a few of the many types and sizes of standard Perkins Presses. Presses built to customers' special specifications.


No. 12-H-36 STRAIGHT SIDE, SINGLE CRANK TIE-ROD CONSTRUCTION PRESS CAPACITY 200 TONS

Perkins Power Presses SINCE 1885
PERKINS MACHINE CO.
WARREN, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 118

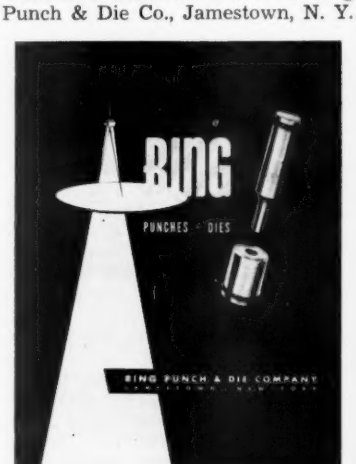
Milling Machines. The improved Type "G" milling machines built by the Kempsmith Machine Co., Milwaukee 14, Wis., are illustrated and described in a bulletin now available. Specifications and dimensions are provided.
Circle Inform-A-Gram No. B58.

The Model Net Agastaf Time Delay Relay is designed to introduce either a sequence of time delay periods—or a momentary impulse into an electrical circuit. Read about the features and applications of this unit in a circular now available from the A'G'A Div., Elastic Stop Nut Corp. of America, 1027 Newark Ave., Elizabeth 3, New Jersey.
Circle Inform-A-Gram No. B59.

High Temperature Electric Furnaces are introduced in literature available from the Caljorn Co., 1168 Watson Ave., Whittier, Calif. Applications, exceptional features and dimensions and specifications of the furnaces are included in the bulletin. The new line of "Thermocal" units described, come in six standard sizes from 6" x 6" x 9" to 24" x 24" x 29".
Circle Inform-A-Gram No. B60.

Inverted Hydraulic Presses. A new line of compact, inverted hydraulic presses adapted to bending and extrusion operations on ferrous and non-ferrous tubular parts as well as upsetting, drawing and coining operations, is described in a bulletin available from Walter P. Hill, Inc., 22183 Telegraph Rd., Detroit 19, Mich.
Circle Inform-A-Gram No. B61.

Precision Punches & Dies are illustrated and described in Catalog #104 now available from the Ring Punch & Die Co., Jamestown, N. Y.



Besides covering punches, dies, quills, retainers and counterbores, the booklet contains engineering data and specifications.
Circle Inform-A-Gram No. B62.

A New Type of Machine Tool, the Howe & Fant Turret Drilling machine is described in literature offered by Howe & Fant, Inc., 26 Fitch St., E. Norwalk, Conn. Basic advantages, set-up and design features are related in this brochure.
Circle Inform-A-Gram No. B63.

Machine Tool News. Published in the interest of machine tool users everywhere is a bulletin describing more than 50 machines such as boring mills, brakes and shears, broaches, drills, grinders, lathes, etc. The brochure is available from Morey Machinery Co., Inc., 387 Lafayette St., New York 3, N. Y.
Circle Inform-A-Gram No. B64.

"Talide Rolling Mill Work Rolls" is the title of Technical Bulletin No. TB-3 issued by the Metal Carbides Corp., Youngstown, Ohio. Included in the bulletin is a description of the difference between Grade A and Grade B rolls, as well as a list of types of strip steel that can be satisfactorily rolled with Grade B rolls and types of strip steel which require Grade A rolls to obtain the proper finish.
Circle Inform-A-Gram No. B65.

Graphitic Tool Steels. The aim of this booklet is to make available a relatively complete picture of the four Timken graphic tool steels—Graph-Tung, Graph-Al, Graph-Mo and Graph-M,N.S.—produced by the Timken Roller Bearing Co., Steel and Tool Div., Canton 6, Ohio. The comprehensive booklet contains heat treating data, physical properties and many interesting applications.
Circle Inform-A-Gram No. B66.

Products for Industry. The purpose of this catalog is to provide a convenient listing of the wide range of stock products manufactured by the S. S. White Dental Mfg. Co., 10 E. 40th St., New York 16, N. Y. While some of the products discussed were originally developed for the dental field, all items mentioned have important applications in industry. There is also a handy reference index for quick direction to any item listed.
Circle Inform-A-Gram No. B67.

Abrasive Materials. The "Blastrite" line of abrasive materials, including chilled cast iron, Hi-alloy "B" cast iron and malleable shot and grit, and steel and cut steel wire shot are all described in Catalog No. AB-53, published by the Abrasive Shot and Grit Co. of Springville, N. Y. Each product, its properties and uses, is fully explained. Included in the catalog is a Consumption chart which lists the various types of abrasives and their consumption in pounds per wheel hour.
Circle Inform-A-Gram No. B68.

Gas Fork Lift Trucks with electric transmissions are described in a new brochure published by the Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill.
Circle Inform-A-Gram No. B69.

Chemical & Physical Characteristics of Plast-Iron B-212, a reduced-oxide iron powder designed specially for compacting parts requiring high tensile or transverse strength, are given in Technical Data Sheets PMS 28A and 28B recently issued by Plastic Metals Div., The National Radiator Co., Johnstown, Pa.
Circle Inform-A-Gram No. B70.

Optical Flats and light wave measurement equipment manufactured by the Acme Scientific Co., 1450 W. Randolph St., Chicago 7, Ill., are illustrated and described in a catalog now available.
Circle Inform-A-Gram No. B71.

Miniature Clutches. A new descriptive bulletin depicting a line of miniature, one-way roller clutches, which permit drive in one direction with free-wheeling action in the opposite direction, has just been issued by Miniclutch Co., 379 Morse St., Hamden, Conn.
Circle Inform-A-Gram No. B72.

For that "light fingered" touch in those hard-to-get-at places

VERSATILE POWER— OUT OF THE WEIGH

Power with the light-fingered touch—for those hard-to-get-at places! Haskins Flexible Shaft Equipment lets the power do the job without burdening skilled hands with heavy motors. For every job of grinding, sanding, filing, polishing or buffing—from ¼ HP to 2 HP—Haskins tools increase production and cut costs. Two good reasons why you should write for the latest Haskins Catalog.

The Haskins line provides a wide variety of models with drives, horsepowers, speeds, tools and attachments—including the one assembly exactly suited for your particular job.

haskins

R. G. HASKINS COMPANY • 605 S. WASHTENAW ST., CHICAGO, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 119

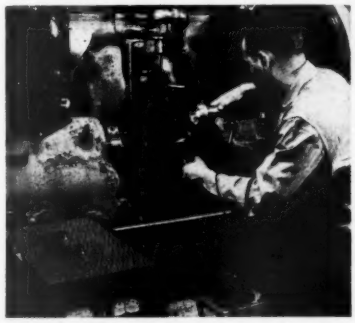
INSTRUMENT DETECTS ABNORMAL VIBRATIONS

An instrument called the "Vibratron" is making the job of maintaining extreme accuracies in Timken roller bearings a simpler and easier task. A portable device, the instrument is used to detect abnormal vibration in the rotating parts of a production machine, without the necessity of dismantling the machine.

By using the Vibratron in its maintenance program, the Timken Roller Bearing Company has been able to maintain an average vibration level on its grinding machines to .000090 (ninety millionths of an inch). Accuracy built into a machine, and kept there by careful maintenance, makes possible production of accurate and precise tapered roller bearings.

The Vibratron consists of a vibration pickup, a filtering probe, a stroboscopic lamp, and electronic equipment that indicates and records frequency and amplitude of vibration.

Detecting out-of-balance parts, formerly a slow tedious task, has been greatly speeded up. Out-of-balance conditions can now be detected while the machine is operating. To correct a machine



that is out of balance, the following steps are taken:

First, the machine is completely shut down. A reading is then taken with the Vibratron. The probe of the instrument is placed on the spindle, bearing, or housing (see photo). This reading will show how much vibration is present in the floor of the building upon which the machine is set, and how much vibration is transferred to the machine being tested from other machines. This reading will represent the best obtainable after the machine in question is balanced.

Then, with the pickup probe still in position, the various parts of the machine are started one at a time and the amplitude reading observed after each successive step. This indicates which parts of the machine give the most vibration. The part is double checked with the light, which is triggered by the strongest vibration in the pickup probe.

From this point on, it is simply a matter of balancing the unbalanced part by replacement or repair until the reading approaches as nearly as possible the reading taken with the machine shut off.

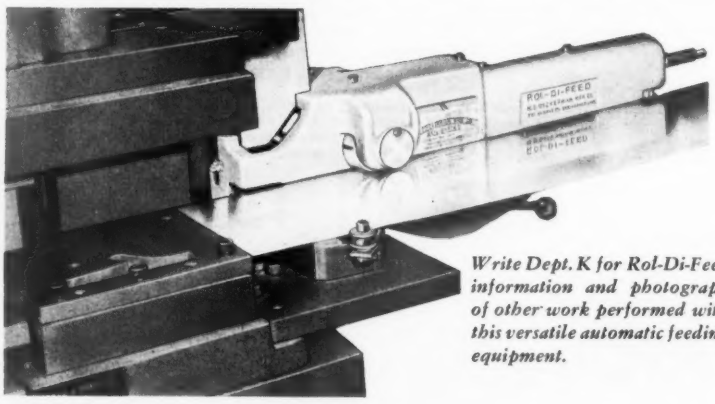
"Dickerman-Rol-Di-Feed a Dreamboat"

say Makers of the Dream Car

MATTEL, INCORPORATED of Los Angeles, "Toy Makers to His Majesty the Kid," has become in a few short years a foremost manufacturer of toys. Production and assembly techniques employ the latest methods and equipment. In the Metal Stamping Department, Dickerman Automatic Punch Press Feeds have long been used for their dependability and accuracy.

Says Mr. Dolfe Lee, Plant Engineer, "Feeding this wide, pre-chrome plated stock for the stamped parts of our Dream Car is a tough job. We can tolerate no marking or blemishes of any sort from the feeding operation, and the Rol-Di-Feed has met our exacting requirements in every way. We've increased production and reduced our labor cost. The Rol-Di-Feed is a Dreamboat."

You, too can benefit from the installation of Dickerman Automatic Punch Press Feeds in reduced parts cost per thousand and higher production. You may not feed mirror-finish stock, but whatever your feeding problem, one of our several models will solve it.



Write Dept. K for Rol-Di-Feed information and photograph of other work performed with this versatile automatic feeding equipment.

Dickerman

H. E. DICKERMAN MFG. CO.
324-221 Albany St. • Springfield, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 120

CLASSIFIED ADVERTISING

RATES — $2.00 SERVICE CHARGE PLUS 20c PER WORD, PAYABLE IN ADVANCE

DEALERS WANTED—For Complete Line precision checking instruments . . . Dial Indicators, Test Sets, Bench Center Sets, Production Bench Gages, Dial Snap Gages, Depth Gages. Backed by Sales Promotion — Catalog and National Advertising. Manufacturer invites inquiries. Write Box 654, TOOLING and PRODUCTION, 1975 Lee Road, Cleveland 18, Ohio.

SEAMLESS TUBING FOR HIGH STRESS AND TEMPERATURE WORK

An alloy steel designed for use in equipment operating under conditions involving high stresses and temperatures, is now commercially available in seamless tubular form.

Through the use of the hot extrusion production process, the manufacturer is now turning out Universal Cyclops Uniloy 19-9DL in a limited size range in seamless tubing. The alloy has been produced in welded tube form for some time.

At present, the alloy is most commonly used in jet engines, experimental aircraft and gas turbines. It has exceptionally good strength at temperatures up to 1200° F and has been used successfully at somewhat higher temperatures for some applications.

Since seamless tubing is required or desirable for considerable eqiupment operating under conditions involving high stresses and temperatures, its availability in the high-stress, high-temp alloy will be beneficial to many industries.

The hot extrusion process is also applicable to the production of seamless tubing from metals that do not lend themselves to rotary piercing. Such metals include titanium and certain of the stainless steels, which are needed for greater advancement in the aircraft, atomic energy, power generation, petroleum and chemical industries.

—— • ——

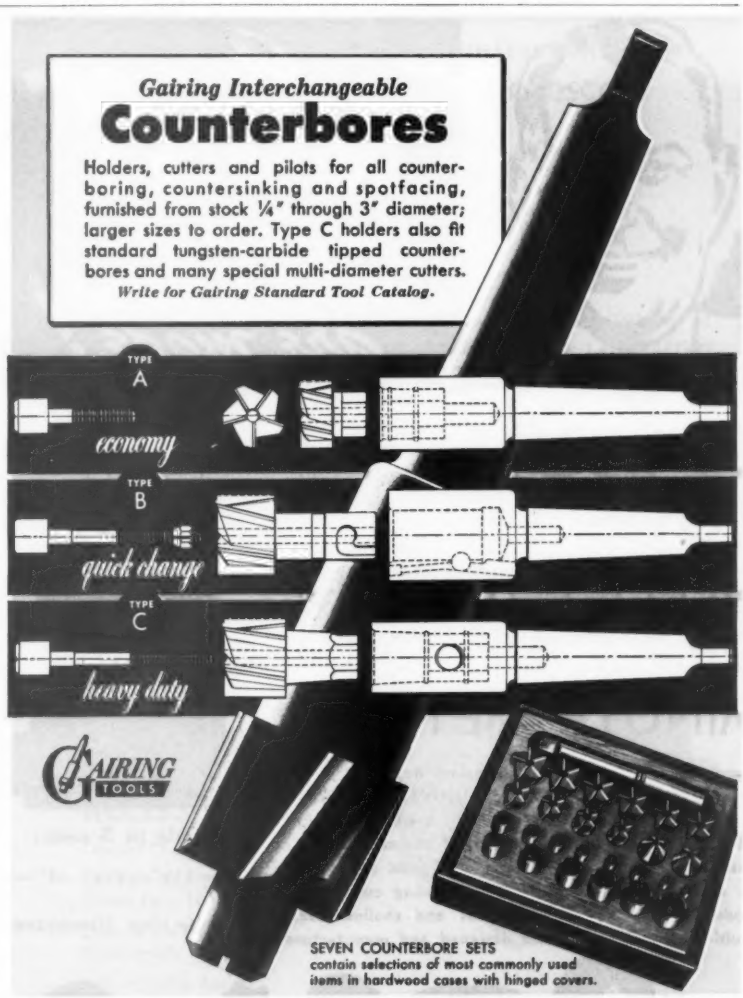
PLASTIC EXPOSITION

Leading manufacturers who use plastics in their products will explain how and why at the Technical Conference that will run concurrently with the 1954 National Plastics Exposition sponsored by The Society of the Plastics Industry, Inc., to be held June 7-10, 1954 at Cleveland, Ohio's Public Auditorium. E. L. Frantz, Chairman of the Conference Committee, reports that the four industries taking part in the program are radio and television set makers, the rubber (elastomers) industry, refrigeration and air conditioning manufacturers, and automobile producers.

The Exposition will be unique in that talks by the plastics industry's customers will feature the technical sessions. Speakers from diversified segments of the plastics industry itself will man one program, which will cover new plastic materials and new methods of fabrication.

Visitors will be able to attend both the Conference and the Exposition without conflict, for the technical forums are scheduled for downtown Cleveland hotels at ten o'clock each morning, while the Exposition will not open until one o'clock in the afternoon.

The National Plastics Exposition is sponsored by The Society of the Plastics Industry, Inc., New York, a trade and technical society representing 804 companies and 2,015 individuals in the plastics industry throughout the United States, Canada, and 20 other countries.


Gairing Interchangeable
Counterbores
Holders, cutters and pilots for all counterboring, countersinking and spotfacing, furnished from stock ¼" through 3" diameter; larger sizes to order. Type C holders also fit standard tungsten-carbide tipped counterbores and many special multi-diameter cutters.
Write for Gairing Standard Tool Catalog.
TYPE A
economy
TYPE B
quick change
TYPE C
heavy duty
GAIRING TOOLS
SEVEN COUNTERBORE SETS
contain selections of most commonly used items in hardwood cases with hinged covers.

Although we at GAIRING like to prove to you our ability to design and produce special production tooling, don't come to us for the tough jobs only • The counterbores shown here, with various holders. the standard back spotfacers and core drills, are real quality production tools made by us for 35 years. Better write us today for the GAIRING Standard Tool Catalog and Price List.

In Canada: A. C. Wickman (Canada) Ltd., Queensway, Toronto 14

The GAIRING Tool Company

21227 Hoover Road • Detroit 32, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 121

MEN YOU SHOULD KNOW . . . .

Alexander H. d'Arcambal

Charles W. Deeds

Richard W. Banfield

R. S. Howe

Glenn C. Lechleitner

Officers elected at the recent organizational meeting of the board of directors of the Niles-Bement-Pond Co., West Hartford, Conn., were: **Alexander H. d'Arcambal,** president; **Charles W. Deeds,** chairman of the board of directors; and **Richard W. Banfield,** executive vice president.

◆

Ralph S. Howe was named president of The New Britain Machine Co. at the annual meeting of the firm's board of directors. Mr. Howe, previously served as executive vice president. Other appointments approved by the directors were: **Robert T. Frisbie,** chairman of the executive committee of the board; **Julian C. Pease,** executive vice president; **Clarence E. Bachman,** vice president in charge of the Products Division; and **George G. Wilcox,** vice president in charge of the Hand Tool Division.

◆

Appointment of **Glenn C. Lechleitner** as general manager of the Cleveland Punch & Shear Works Co. of Cleveland has been announced. Before joining the organization four years ago, Mr. Lechleitner was associated with the production and production control end of the press and heavy machine tool industry.

◆

Maurice M. Clemons has been appointed engineer of Sahlin Engineering Co., Birmingham, Mich. Previously, Clemens was associated with General Motors Corp., for 25 years, more recently as master mechanic of the Chevrolet-Cleveland Pressed Metal Division.

◆

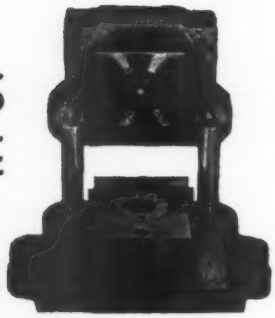
The new director of standards and research for the Hanson-Whitney Division of the Whitney Chain Co. of Hartford, Conn., is **W. H. C. Berg.**

◆

Curtis I. Kahler was recently appointed honing equipment sales manager to cover the Midwest and Eastern territories for the Barnes Drill Co., Rockford, Ill.

"A MUST wherever WASHERS are made!"

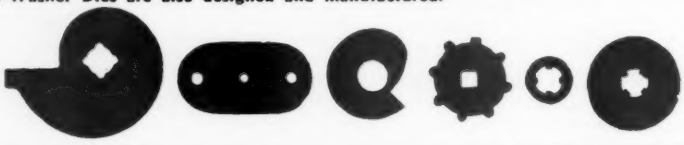
HOVIS
OFFERS YOU THIS SIMPLE, UP-TO-THE MINUTE METHOD



There's no need to make a complete new Die for any type washer or blank. The HOVIS UNIVERSAL WASHER DIES provide a Master Holder and by merely changing 5 SMALL, EASILY REMOVABLE PARTS the new washer or blank is produced . . . Special sets of parts are available for use in Master Washer Units enabling customers to produce irregularly shaped pieces and shallow draws. Multi-Washer Dies are also designed and manufactured.

Made in 5 sizes:
¾"—1½"—2½"—4"—6"

Write for literature.



HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD VAN DYKE, MICHIGAN
Phone: Slocum 7-4800 Suburb of Detroit

CIRCLE INFORM-A-GRAM KEY NO. 122

. . . . MEN YOU SHOULD KNOW

Frederick D. Fernsler

Hugh T. Price, Jr.

William F. Wilson

Sidney Andrews

Edward H. Farmer

The Standard Pressed Steel Co., Jenkintown, Pa., has appointed **Frederick D. Fernsler** as manager of the firm's Unbrako-Flexloc Division. In his new position, Mr. Fernsler will be responsible for the sales, sales service and shipping of Unbrako socket screw products and Flexloc locknuts.

◆

Hugh T. Price, Jr. has been named factory manager of the Norton Company's grinding machine division. **Roland T. Nelson** replaces Mr. Price as production manager, while **Oscar A Erickson** takes over Mr. Nelson's job as planning engineer.

◆

The Gear Grinding Machine Co. of Detroit announces the appointment of **William F. Wilson** as works manager. Mr. Wilson, who came to Gear Grinding from the Walker-Turner Division of the Kearney & Trecker Corp., will be in charge of all manufacturing operations in the company's Joint Division, Gear Division, and Machine Tool Division.

◆

Sidney Andrews has been named vice president in charge of research and development for the Metal Removal Co. of Chicago. He will be working on the firm's abrasive grinding wheels, discs and mounted points.

◆

Edward H. Farmer has been appointed plant manager of E. W. Bliss Company's recently acquired San Jose, California Works. Farmer has been associated with Lockheed Aircraft for the past 12 years, more recently as works manager. Previously (from 1929 to 1941) he was employed by E. W. Bliss at the Toledo, Ohio, Division. He was assistant works manager at this plant from 1939 to 1941.

◆

Theodore C. Koch, formerly vice-president in charge of Manufacturing of the Ace-Central States Machine Tool Co., Detroit, has been named general manager of the firm.

Gaertner OPTICAL INSTRUMENTATION

TOOLMAKERS' MICROSCOPE

READS TO .0001"

DIRECT COORDINATE MEASUREMENT

PLUS - - -

THESE LISTED FEATURES MAKE THE TOOLMAKERS' MICROSCOPE AN ALMOST INDISPENSABLE INSTRUMENT IN YOUR SHOP OR LABORATORY.

Range 2 x 4 Inches

360° Stage Rotation
Reading To 1 Minute

Protractor Circle
Rang 360°
Reading To 1 Minute

Magnification 30X

Stage Motion
By 2 Inch
Precision Screws

Column Tilt 8°
For Helix Measurement

Rugged Construction
For Dependable
Accurate Service

ACCESSORIES

Templet Ocular Head

Standard Radius And
Thread Form Templets

Camera and Projection
Attachments

Inch or Metric Scales

Magnification From 10X To 100X

For a completely illustrated book listing detailed specifications and accessories request Bulletin 147-50.

THE GAERTNER SCIENTIFIC CORPORATION

1242 Wrightwood Avenue • Chicago 14, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 123

AUTOMATIC FACTORIES NOT YET HERE---AUTOMATION IS

Although the automatic factory may not be here, full automation is a reality in many factory operations.

That was the concensus of a panel of experts in a workshop session held recently at Illinois Institute of Technology, as part of a Work Study Conference attended by engineers and executives from industry. Automation panel chairman was Prof. H. H. Young of Purdue University.

Panel members agreed that automation can be made to pay its way, but they added that each situation must be carefully analyzed before investments in automatic equipment are made.

Such analyses, they said, should show where the equipment will amortize itself and where it won't. They explained that a manufacturer ordinarily must take it a small step at a time, automatizing one process and then another.

As an example, panelist L. J. Bishop of Mechanical Handling Systems, Inc., described a machine his company had built and installed for a manufacturer of foam-rubber mattresses. Starting with liquid latex, the machine performs each operation successively and automatically with only 14 operators. It runs 24 hours a day and six days a week, almost no service.

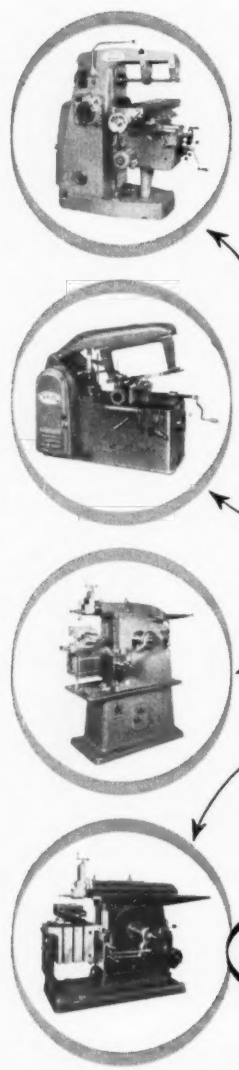
"However," Bishop warned, "you don't build a machine like that overnight. You need a lot of experience, and you have to be sure you build quality into it. Otherwise the customer will lose in maintenance costs what he gains in efficiency."

Another panel member, C. F. Hautau of Hautau Engineering Company, supplied other striking examples of automation that has arrived. He described a manufacturer of coaster brakes faced with going out of busness because foreign manufacturers, using cheaper labor, could undersell him. Hautau's organization was called in and was able to reduce costs to a competitive level by making the process more automatic. "Automation can revive a dying industry," Hautau declared. "In some cases, it is the last resort."

Hautau also described a grinding machine for roller bearings that checks each piece as it is made. If it is imperfect, the machine automatically compensates. It then checks the next piece and compensates again if necessary. "Continuous part-to-part correction of this sort is feasible in quantity production only with automatic equipment," he said. "It is the answer to the problems of many manufacturers of high-precision parts."

L. F. Hesse, Gisholt Machine Company, agreed that automation is the answer in many processes. He cautioned, however, that there still are jobs that cannot yet be taken over by automatic machines. "Everything depends on the economics of a particular job," he said.

E. H. Wavering, Motorola, Inc., Chicago, described the radio and television set manufacturers as being considerably behind some other industries in adopting automation techniques.



Swedish Craftsmanship!

headquarters

FOR THE FINEST
SWEDISH MACHINE TOOLS

Austin is American headquarters for the fine machine tools that are manufactured in the modern Swedish machine tool center of Värnamo.

Built with the painstaking workmanship and quality materials that characterize Swedish products, these machine tools, since their introduction in the U.S.A., have earned an enviable reputation for accuracy and dependability in toolroom and production line. All machines comply fully with U. S. Standards.

SAJO #2 ALL GEARED MILLING MACHINES – plain and universal models – light and standard types, all built to modern design to meet industry's demand for fast, simplified operation while maintaining maximum accuracy. Available with longitudinal power feed only or with power feed and rapid traverse in all directions. Offered with full line of accessories.

SAJO HYDRAULIC HACKSAWS – Utility and Production Models – 6" x 6", 9" x 9" and 10" x 10" capacities. These sturdy machines, for intermittent or production duty, have unique patented features and are attractively priced. Sajo Hacksaws represent exceptional values in cutting off equipment.

PREMA 13" SHAPER – a "mighty mite" – ideal for applications where large shapers are not justified. "Big Shaper" performance and accuracy at modest cost makes the Prema a profitable addition in the toolroom or on light production work.

VMA SHAPERS are available in both standard and heavy duty models – 14" to 26" length of stroke. These rugged amply powered machines provide speedy set-up, ease of operation and maximum stamina in the toolroom or production line. Automatic lubrication and table power rapid traverse are standard on heavy duty models. Universal table and other accessories are available.

Service and spare parts available from us or from our dealers in principal cities.

For complete details, illustrated catalogs and information as to reference installation in your vicinity write to

Austin INDUSTRIAL CORPORATION

76-X MAMARONECK AVENUE, P. O. BOX 430, WHITE PLAINS, N. Y.

Look for the Austin Seal – your full guarantee of satisfaction.

CIRCLE INFORM-A-GRAM KEY NO. 124

SWITCH IN CARBIDES BRINGS 10 TIMES LONGER TOOL LIFE

Interrupted cutting of hard, tough, heat-treated SAE 4340 alloy steel (220,000 psi tensile strength) forgings is currently being handled at an increased speed and with over ten times longer tool life by a switch from standard brazed carbide tools to sintered tungsten carbide triangular insert tooling.

This operation, performed at the Menasco Manufacturing Co., manufacturer of aircraft landing gears, consists of rough and finish facing both sides of a star-shaped 11″ diameter forging on

a 10-hp Warner & Swasey No. 2A turret lathe as shown in the above photograph.

Previously, this job was performed with various grades of standard style GR-16 tools at 87 rpm, 0.0035″ feed and 0.030 to 0.095″ depth of cut. Even at this relatively low speed and feed, best tool life obtained was only two to four pieces per grind. Three cuts were also required for each side of the forging.

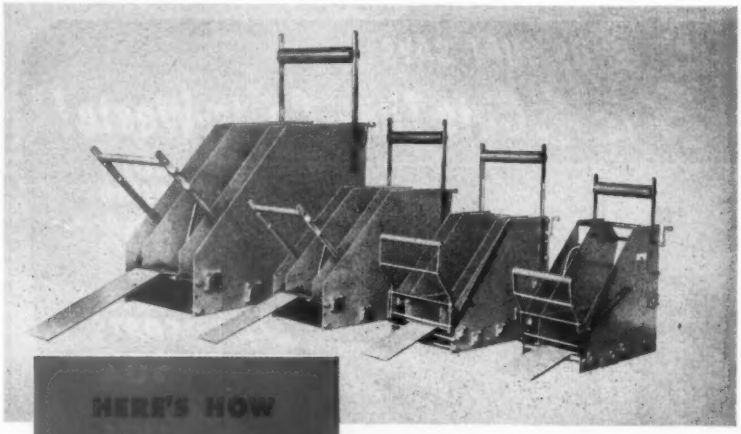
Because of this limited tool life, Menasco made a change to the insert-type tools which permitted operators use of a harder grade of tungsten carbide.

Standard style TFR-16A, grade K5H triangular insert tools are used for the rough cut at 101 rpm (290 sfpm) and for the finishing cut at 134 rpm (385 sfpm). This is one and one-half times greater speed than they were able to use. Feed used is now 0.0075″ per revolution — twice that previously utilized.

Now only two cuts for each face of the workpiece are required. Depth of cut on roughing is 0.030 to 0.125″ and 0.030″ on finishing. Under these stepped-up operating conditions, nine pieces are machined before any indexing is required. Since three cutting edges are available on each end of the triangular insert, both sides of 54 pieces are faced before regrinding of the tungsten carbide tool is necessary. Cimcool coolant is used in this operation.

Changing time for Menasco's previously-used tooling was 6.25 minutes. Time for indexing or rotating the triangular carbide insert tool to a new cutting edge is now only 45 seconds. To regrind the brazed tool required 15 minutes; now, both ends of the inserts are reconditioned in only 10 minutes production time.

Get the information YOU want conveniently and quickly — use a TOOLING and PODUCTION INFORM-A-GRAM CARD — page 133.



HERE'S HOW benchmaster Koil Kradle IMPROVES ALL AUTOMATIC FEEDING!

BIGGER COIL CAPACITY—handles 200 to 400% more weight at one time!

FEWER SHUTDOWNS—Big coils run hours longer, eliminate production losses during reloading periods!

FASTER, EASIER LOADING—you simply roll the coil up the ramp into feeding position. No heavy lifting. Strenuous labor is eliminated!

MORE PRODUCTION—automatic power feeding *as your machine needs it*, puts more footage through per hour!

VARIABLE TIME DELAY allows operator to set unit to consistently maintain any desired length of slack loop.

KOIL KRADLE automatically supplies a slack loop from any type of coiled stock, wire or strip. Can be used with punch presses, slitters, shears, forming rolls, etc. Removes drag on feeding devices, improves locating accuracy on multiple and progressive die operations.

Write for new circular!

Benchmaster Manufacturing Co. 1835 W. Rosecrans Ave. Gardena, California

benchmaster

World's largest manufacturer of small punch presses and dies

CIRCLE INFORM-A-GRAM KEY NO. 125

. . . Permanent Magnets, from page 111

from being knocked off the machine.

On machining jobs, workers consumed considerable time fishing chips out by hand. Now, with a magnetic probe, they can do a clean-out job in seconds. One manufacturer uses magnets to remove tramp iron from his die-casting machines while the metal is still molten.

Much time can be lost trying to recover nuts, bolts, screws or parts dropped accidentally into inaccessible places in a machine. With a magnetic retriever, the job is easy.

Hand magnets are replacing tongs in the handling of hot parts or items which might be damaged by the tongs. And magnetic holding devices, attached to flashlights, levels, tools and even thermometers, help maintenance, service and repair men to do a faster job.

Magnets also prove valuable in such devices as magnetic tool holders, which eliminate lost time hunting for misplaced tools, and magnetic chucks that never get hot or wear out. There are even magnetic plumb bobs, vises and layout punches.

Prove Valuable Inspection Aid

Permanent magnets find numerous uses in an inspection department. They are used to hold items in proper positions for inspection under profilometers or comparators. Loose jar caps can be detected with a magnetic device. Sorting of non-magnetic parts, which become mixed together during processing, can be done automatically with magnets. The same is true for mixed scrap. Purchased items which are supposed to be non-magnetic can be automatically inspected with magnets.

The thickness of non-magnetic coatings on magnetic parts can be accurately determined by a magnetic thickness tester.

Where a finished product must be fastened down in order to run an operating test, magnets are far superior to any form of clamping. And where a finished product must be connected directly to a motor for a final test run, magnetic couplings will eliminate the time spent in fastening mechanical couplings.

Here, too, magnetic bases for lights, gauges, indicators and test equipment accelerate the work.

Permit Better Work-Area Lighting

Industry, in general, recognizes that good lighting speeds up production, increases safety and reduces rejects.

Stationary lights on machines are often a compromise in that good lighting exists in one small area only directly under the light. Magnetic bases on such lights enable the operator to mount them anywhere on the machine in the best position for working. They also permit him to move them from one location to another with comparative ease.

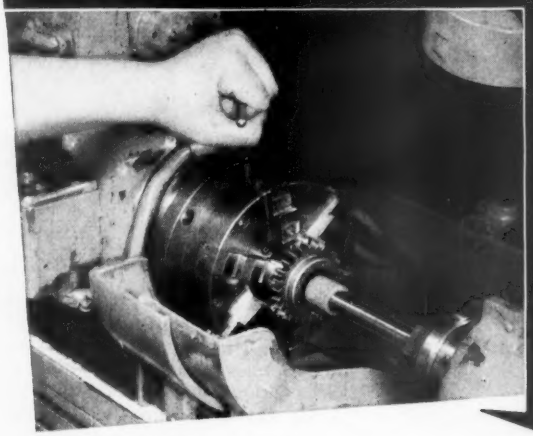
Such devices are still more valuable to service, maintenance, repair and set-up men when trying to set up a new operation or when getting a machine back on the line. Since a breakdown in one machine can shut down an entire production line, this advantage is of special importance.

Miscellaneous Plant Uses

Magnets can also do a great many odd jobs efficiently.

SHOP SUPT. SAYS...

"Buck Cuts Time-Costs-Waste!"



CUTS TIME 30% • CUTS COSTS 50% • CUTS REJECTS 15% to 20%

Buck on Grinders-Lathes

AJUST-TRU

PAT. NO. 2,639,157

CHUCKS

Only universal scroll chuck with .0005" precision — for lathes, grinders, dividing heads, screw machines.

3-jaw and 6-jaw in 4", 5", 6", 7½", 9" sizes. 2-jaw Aviation chucks, for odd-shaped parts, in 6", 7½", 9" sizes.

ALSO SUPER-GRIP 4-JAW INDEPENDENT CHUCKS FOR 9" to 16" LATHES.

Globe Gear Co., Royal Oak, Mich., makes this report. They use Buck 6"-6 jaw and Buck 6"-2 jaw Ajust-Tru Chucks on the Parker-Majestic Internal Grinder, South Bend Lathe and Monarch Lathe for drilling, boring, reaming.

On work held to .0005" precision they report a 30% saving of time compared to previous methods . . . 50% cost saving per operation . . . and 15% to 20% reduction in rejects.

You too can save every time you use Buck Ajust-Tru Chucks. They adjust to dead true precision within one minute . . . guarantee .0005" precision on duplicate rechucking . . . eliminate special collets, reduce need for stub arbors, mandrels, special fixtures. No price premium for Buck chucks. Send for catalog today.

BUCK TOOL COMPANY

618 SCHIPPERS LANE • KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 126

When planning a new building with buried pipes or conduits, magnets spotted at connection points can be located anytime with a compass. Magnetic hangars, hooks, tags and signs are in great demand where partitions are made of steel.

Magnetic holders for drawings and instruction sheets allow the operator to mount them in the most advantageous places, and eliminate the need for lifting and placing them down. They also diminish the chance of error.

Trays for work-in-process with magnets, instead of dividers, reduce the chance of accidental spillage. Covers and spouts which must be changed frequently can use magnetic latches to advantage. And magnetic perforating and punching dies allow inexpensive and rapid changes in setups.

Serve Painting And Plating Needs

Often it is necessary to mask identification decals or name plates on a machine or device. Masking tape is expensive, slow, must be cut to size and is expendable. Such masking is now being done with a thin strip of brass mounted on the poles of a magnet. There is no tape to cut, and your first expenditure is your last.

At one time the only way to clean out a plating tank or to retrieve dropped parts was to fish them out with a mechanical rake. This was a slow and tedious task and everybody hated the job. Today, a magnetic sweeper, magnetic rake or a magnetic fishing tool will do the job quickly and easily.

Formerly, it was also necessary to wire small parts to a plating rack, and then unwire them after the operation. Today, such parts are spotted on a magnetic plating rack and quickly stripped off when the plating job is done.

Safer Processing Through Use of Magnets

Magnetic separators are in use in every industry to free its products of tramp-iron contamination and to protect expensive processing machinery and equipment against damage, breakdown and fire. The last ten years have seen the permanent magnet separator — whether it be a plate, a pulley or a drum—outperform all other types. Manufacturers of food, clothing, textiles, chemicals, plastics, pottery, foundry items and a host of others have derived great benefits from these products.

Magnetic liquid separators are available which remove filings and grindings from coolants before they are recirculated to machines. There are no filters necessary and nothing is expendable. Magnetic drain plugs in crank cases also increase the life of engines and hydraulic systems.

Magnetic sweepers clean aisles, runways, roads and parking lots. They can be attached to lift trucks or other vehicles in constant motion through a plant, thereby eliminating much of the labor in their operation. Transparent shields held to machines with magnets also prevent injuries and dangerous wet spots on floors.

Tumbling And Welding

Anyone who has paid a large group of operators to sort out manually finished parts from tumbling stones — after the tumbling operation is finished —

. . . *Continued on page 130*

✓SAVE UP TO 40% SPACE!
✓EXTRA HIGH SAFETY FACTOR!
✓DEPENDABILITY . . . backed by 38 Years of Know-How!
CIRCULAR HEADS WITH TIE RODS
SQUARE HEADS WITH TIE RODS
T-J T-J T-J
SPACE SAVED
T-J SPACEMAKER provides additional room for adjacent equipment without sacrificing strength.

NEW (T-J)

Spacemaker AIR CYLINDERS

Off shelf delivery all styles to 3" bore in increments of 1" to 12" stroke.

Streamlined design of the new T-J Spacemaker *eliminates tie rods . . . saves up to 40% in mounting space!* It's performance-proved . . . *super rugged* with extra high safety factor . . . solid steel heads . . . heavy wall, precision honed, *hard chrome plated,* seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, hi-tensile, *hard chrome plated* piston rod.

Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . for pushing, pulling, lifting, clamping or control jobs. T-J dependability. Write for bulletin 454. The Tomkins-Johnson Co., Jackson, Mich.

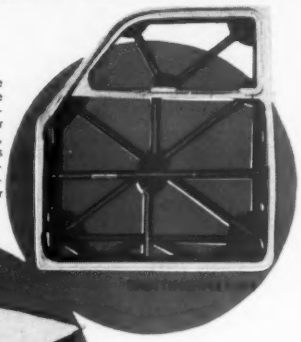
(T-J) TOMKINS-JOHNSON

CIRCLE INFORM-A-GRAM KEY NO. 127

REN-ITE* THE MOST TRUSTED NAME IN PLASTICS

Meets the tooling needs of American industry.

From the broad Ren-ite experience and unrivaled facilities have come modified Epoxy Resin materials, tailored for your tooling needs. For Master Keller models, skin panels, checking and welding fixtures; dies and prototypes or other tooling applications you are assured of an uncompromising standard of quality for your tooling program.



The above photos show some of the many uses of Ren-ite tooling plastics, and standard stock plastic tubing. Write today for an illustrative brochure and complete price schedule.

Ren•ite PLASTICS, INC.

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OFFICES IN CHICAGO, CLEVELAND, DETROIT, LOS ANGELES, NEW YORK AND ST. LOUIS.

*"Ren-ite," "The Dimensionally Stable Tooling Plastic" and "Comminuted for Quality" are Trademarks of Ren-ite Plastics, Inc.

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JACO Horizontal

STOCK REEL

LOW COST — AUTOMATIC

No motors — No belts — No sprockets

POWERED BY THE NATURAL SPRING OF UNCOILING STOCK . . .

JACO Stock Reel operates automatically . . . without attention or maintenance . . . so simple there is nothing to get out of order.

The loop of stock between the Coil and the Press Feed completely eliminates slippage, kick-back and over-run.

JACO Stock Reels handle all types of resilient coiled stock for light stampings up to 250 lb. coil weight . . . up to 36" coil diameter . . . up to 6" stock width.

Proved in actual use by major manufacturers.
Guaranteed to work on your job or money back.

Write today for full details

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JACO DEVICES, INC.

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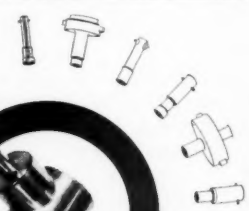
100 HEADS

. . . only ONE body



Dial Bore Gages for "O" Rings, Snap Rings, Thread Reliefs

INTERCHANGEABLE *Measuring Heads*

No need to order expensive new gages for each special internal gaging operation. Just One RIMAT Gage Body needed for any number of special or standard gage heads. A wide variety of standard heads are available **in stock** . . . for small, medium and large "O" Ring and Snap Ring grooves, special grooves, internal splines, counterbores and straight bores. Heads may be interchanged **in seconds.** Tell us about your special gaging requirement!!

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Price Calculator. Just an easy setting of the selector slide on a calculator available from the Trent Tube Co., East Troy, Wis., gives complete price information and weight per foot of welded stainless steel tubing and pipe.
Circle Inform-A-Gram No. C1.

For Better Drilling. Hints and checks for better drilling are contained in a brochure available from the Revere Fisher Engineering Co., North Branch, Mich. The bulletin covers, not only preventive measures to take for drill and reamer breakups, but also faults connected with spindles and chucks that contribute to unsatisfactory drilling. An added section of the brochure features standard drill sizes and decimal equivalents.
Circle Inform-A-Gram No. C2.

Air & Hydraulic Maintenance Manual. "The ABC's on Maintenance of Air and Hydraulic Equipment" is a booklet which brings to TOOLING and PRODUCTION readers a practical explanation of the "rights" and "wrongs" in setting up and servicing air and hydraulic equipment. Emphasis is placed on some of the major reasons for unsatisfactory performance and steps which can be taken to avoid such conditions. Copies are yours for the asking from the Logansport Machine Co., Logansport, Ind.
Circle Inform-A-Gram No. C3.

Physical Specification Chart. An extremely useful calculating wheel, created as an aid to designers, engineers or anyone requiring a quick source of all the physical properties of the various types of Meehanite metal available to industry, is the new Meehanite "Physical Specification Chart for Engineering Design." The chart provides the engineering characteristics of all the metals in the four major classifications under which Meehanite castings are produced—namely, general engineering, heat-resisting, corrosion-resisting and wear resisting. Copies are available by writing to the Meehanite Metal Corp., 714 North Ave., New Rochelle, New York, or—
Circle Inform-A-Gram No. C4.

Machining Stainless Steel Bars. Basic principles in machining all types of stainless steels, plus data on speeds, feeds and correcting machining troubles, are contained in a booklet that can be obtained from Republic Steel, 3100 East 45th St., Cleveland 27, Ohio. The booklet also includes information on tool form, a section of formulae and tables frequently required for statistical quality control work, and data on the new screw thread standards.
Circle Inform-A-Gram No. C5.

Duplication for Aluminum Matchplates. A new technical bulletin entitled, "Cerro Alloys in the Pattern Shop" has just been released by the Cerro de Pasco Corp., 40 Wall St., New York 5, N. Y. This bulletin contains valuable information regarding the making of accurate duplicates of wood patterns in the construction of aluminum matchplates. Included is a description of a novel method of anchoring phenolic plastic, metal or wood patterns in matchplates.
Circle Inform-A-Gram No. C6.

"How to Clean Metal in Aircraft Production" is the title of a 48-page, illustrated booklet available from Oakite Products, Inc., 157 Recto St., New York 16, N. Y. Based on actual, successful applications in leading aircraft manufacturing plants, the booklet reports in detail on specific materials and methods for performing a wide range of production cleaning and related operations. Also included is a helpful section on the selection or construction of equipment so that cleaning and rinsing can be accomplished with the greatest economy in time and material.
Circle Inform-A-Gram No. C7.

Impact Fact Book. A new booklet covering the significant facts necessary to design products as impact extrusions has just been issued by the Aluminum Company of America, 724 Alcoa Bldg., Pittsburgh 19, Pa. Alcoa impacts are one piece, seamless semi-hollow or solid parts having forged bases and one or more extruded side walls.
Circle Inform-A-Gram No. C8.

Gage Selector. A calculator now available from the Sheffield Corp., Dayton 1, Ohio, makes finding "Go" and "Not Go" pitch diameters for all classes of thread ring and plug gages as easy as sliding the tabs of the selector up and down. Also explained on this selector are the various classifications and specifications and external threads.
Circle Inform-A-Gram No. C9.

File Facts. This book is to explain the care and use of files, one of the basic tools of all trades. It contains sections on file terminology, standard file shapes, "do's and don'ts" when filing, and a special section on how saws can be sharpened with files. The booklet is yours for the asking from the Simonds Saw and Steel Co., Fitchburg, Mass.
Circle Inform-A-Gram No. C10.

An Up-To-Date list of 3M adhesives, coatings and sealers meeting government specification requirements is contained in a pocket sized booklet issued by the Adhesives and Coating Div., Minnesota Mining and Mfg. Co., 423 Piquette Ave., Detroit 2, Mich.
Circle Inform-A-Gram No. C11.

A Comprehensive Report to the Plating Field is presented in a booklet, called "Analysis of Gold and Gold Alloy Solutions," offered by Technic, Inc., 39 Snow St., Providence 1, R. I. The booklet contains step by step information on the general methods of determining the gold, copper, nickel and silver content of gold alloy solutions.
Circle Inform-A-Gram No. C12.

Heat Treating Cost Reductions. Short cuts to more effective purchasing of heat treating services plus information required on purchase orders are contained in a folder prepared by the Metal Treating Institute and available from The George H. Porter Steel Treating Co., 1265-71 E. 55th St., Cleveland 3, Ohio. Also, because misunderstandings occur many times as to the exact meaning of some metallurgical terms used in connection with the heat treating of metals, a glossary of heat treating terms is included.
Circle Inform-A-Gram No. C13.

The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: ½ — $1.36; ⅜ — $1.36; ⅝ — $1.58; ⅞ — $1.89. Write for price list

THE O K TOOL COMPANY, INC., Milford 8, N. H.

CIRCLE INFORM-A-GRAM KEY NO. 130A

JIG BORING

and

Large Precision Machining

Done to your specifications

We Have

13 Jig Borers

BLOOMFIELD TOOL CORPORATION

30 Farrand St. Bloomfield, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 130B

. . . Permanent Magnets, from page 127 knows how costly it can be. Magnetic separator pulleys and a conveyor automatically sort one from the other in minutes, or seconds, as compared with hours when done manually.

It is no longer necessary to clamp in place pieces which are to be welded together. A magnetic welding positioner will hold the parts to be welded at any angle. Mounting and removing the pieces is done easily, and the angle can be set or changed quickly and accurately.

Welding machines which run on rails and ride over the work can also be held in place during the welding operation by magnetic stops.

Tool Rooms And Model Shops

Models which are deliberately made in parts, so that they can be taken apart and put together, can be held together with magnets. Magnetic templates will accelerate the work also.

Magnetic hand tools, as outlined elsewhere, are as productive here as in other departments.

Spotting The Uses In Your Plant

Circulation of these ideas to your production and design engineers can save you time, labor and money and help to make your product do its job better.

It is reasonable to expect that you will derive many indirect benefits, too. Almost every day someone finds a new use for magnets in his product. The best way to develop these new uses is to have magnets at work around your plant. Time and again such conditions have stimulated the thinking of people working with them and created suggestions vitally affecting the product of the plant.

If a magnet is right for the job, it cannot be excelled in function or performance. In addition, magnets have a definite appeal to many people, because of their mysterious, unseen power.

You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work now—save money too!

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ROMULUS TOOL & ENGINEERING COMPANY

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BY FAIRFIELD GAUGE CO.

NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

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Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

Toolmakers, Layout men, and Inspectors do better work faster with Micro-Height Gauge.

Write for illustrated circular and prices.

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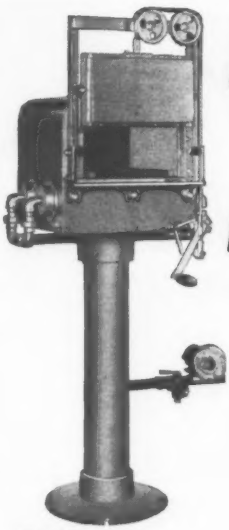
CIRCLE INFORM-A-GRAM KEY NO. 131A



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JOHNSON
No. 130A
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Save time, save gas . . . heat treat carbon and high speed steels, dies and tools with JOHNSON 130A. Powerful burners provide fast, uniform heat. Gets the job done while other furnaces are still warming up. Temperatures easily regulated. Firebox 7" x 13" x 16½" lined with high temperature refractory. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

For temperature range 1400° to 2350° F. . . . $325.00
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Models available in smaller firebox sizes. Write for Free Catalog.

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Since 1901
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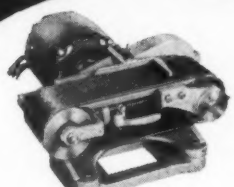

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PRECISE hole location, easy contour inspection with *new* machine tool microscope

Any machine shop, large or small, can save time and money on milling and boring work with the new Perkin-Elmer Model 11 Machine Tool Microscope. For hole location, its wide field of view (¼") or 30x magnification makes it possible to gage accurately to a ten thousandth—*at a glance.*

Mount the Model 11 on an offset bracket or directly in the spindle—it will fit nearly any machine tool. When offset it can be used for transferring hole locations from template to workpiece. The image always appears erect and moves in the same direction as the work, making it ideal for checking contours, slots, surface conditions. The Model 11 Microscope is compact, sturdy, rugged—designed for long life, accurate service.

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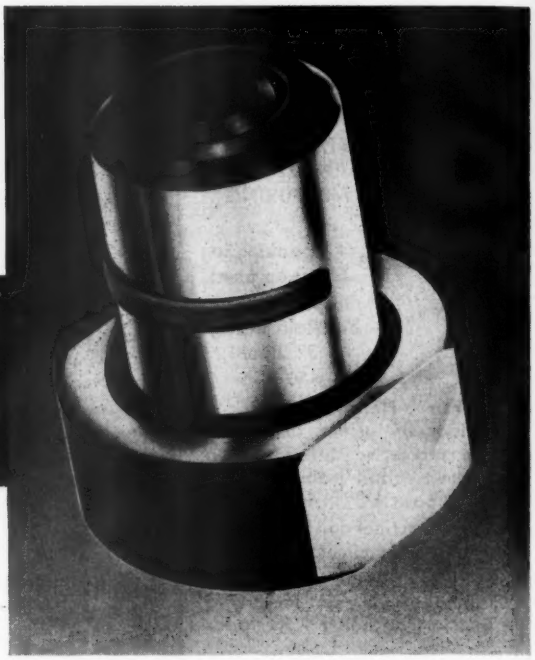

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Drill and tap for 2 — 1/4" screws	3.00
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Old Fashioned Cost Method	$19.62
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SURE LOCK—the new, exclusive development in fixture keys, is meeting with wide success throughout the country. Some manufacturers are ordering them by the hundreds because...every fixture is immediately available to every machine regardless of T slot or size.

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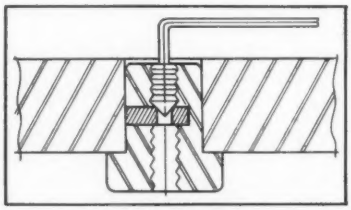
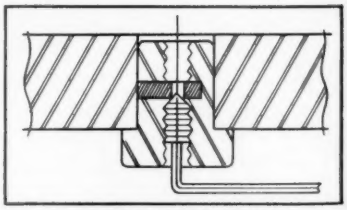


FROM THE TOP



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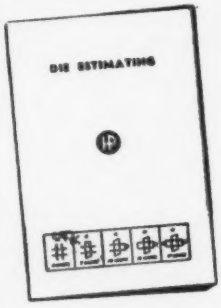

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4	20	36	77	96	109	126	138B	144A	150A	155D	160A	164C	173D	180A	188A
5	21	37	79	97	110	127	138C	144B	150B	156A	160B	164D	174A	180B	188B
6	22	38	80	98	111	128A	138D	144C	150C	156B	160C	165A	174B	180C	189C
7	23	39	81	99	112	128B	138E	144D	151A	156C	160D	165B	175A	180D	188D
8	24	40	83	100	114	128C	138F	145	151B	156D	161A	165C	175B	181A	188E
9	25	41	85	100.1	115	128D	138G	146A	152A	157A	161B	165D	175C	181B	188F
10	26	42	86	100.2	116	130A	139	146B	152B	157B	162A	166A	175D	183	191
11	27	44	87	100.3	117	130B	140A	146C	152C	158A	162B	166B	177A	184A	192
12	28	63	88	100.4	118	130C	140B	146D	153A	158B	162C	166C	177B	184B	
13	29	65	89	102	119	131A	140C	146E	153B	158C	162D	168	177C	184C	
14	30	67	90	103	120	131B	140D	147	154A	158D	163A	169	178A	184D	
15	31	69	91	104	121	131C	141	148A	154B	158E	163B	170	178B	185A	
16	32	73	92	105	122	131D	142A	148B	154C	158F	163C	171	179A	185B	

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4	20	36	77	96	109	126	138B	144A	150A	155D	160A	164C	173D	180A	188A
5	21	37	79	97	110	127	138C	144B	150B	156A	160B	164D	174A	180B	188B
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7	23	39	81	99	112	128B	138E	144D	151A	156C	160D	165B	175A	180D	188D
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11	27	44	87	100.3	117	130B	140A	146C	152C	158A	162B	166B	177A	184A	192
12	28	63	88	100.4	118	130C	140B	146D	153A	158B	162C	166C	177B	184B	
13	29	65	89	102	119	131A	140C	146E	153B	158C	162D	168	177C	184C	
14	30	67	90	103	120	131B	140D	147	154A	158D	163A	169	178A	184D	
15	31	69	91	104	121	131C	141	148A	154B	158E	163B	170	178B	185A	
16	32	73	92	105	122	131D	142A	148B	154C	158F	163C	171	179A	185B	

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A2	A14	A26	A38	B1	B13	B25	B37	B49	B61	C1	C13	E9
A3	A15	A27	A39	B2	B14	B26	B38	B50	B62	C2	D1	E10
A4	A16	A28	A40	B3	B15	B27	B39	B51	B63	C3	D2	
A5	A17	A29	A41	B4	B16	B28	B40	B52	B64	C4	D3	
A6	A18	A30	A42	B5	B17	B29	B41	B53	B65	C5	E1	
A7	A19	A31	A43	B6	B18	B30	B42	B54	B66	C6	E2	
A8	A20	A32	A44	B7	B19	B31	B43	B55	B67	C7	E3	
A9	A21	A33	A45	B8	B20	B32	B44	B56	B68	C8	E4	
A10	A22	A34	A46	B9	B21	B33	B45	B57	B69	C9	E5	
A11	A23	A35	A47	B10	B22	B34	B46	B58	B70	C10	E6	
A12	A24	A36	A48	B11	B23	B35	B47	B59	B71	C11	E7	

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A3	A15	A27	A39	B2	B14	B26	B38	B50	B62	C2	D1	E10
A4	A16	A28	A40	B3	B15	B27	B39	B51	B63	C3	D2	
A5	A17	A29	A41	B4	B16	B28	B40	B52	B64	C4	D3	
A6	A18	A30	A42	B5	B17	B29	B41	B53	B65	C5	E1	
A7	A19	A31	A43	B6	B18	B30	B42	B54	B66	C6	E2	
A8	A20	A32	A44	B7	B19	B31	B43	B55	B67	C7	E3	
A9	A21	A33	A45	B8	B20	B32	B44	B56	B68	C8	E4	
A10	A22	A34	A46	B9	B21	B33	B45	B57	B69	C9	E5	
A11	A23	A35	A47	B10	B22	B34	B46	B58	B70	C10	E6	
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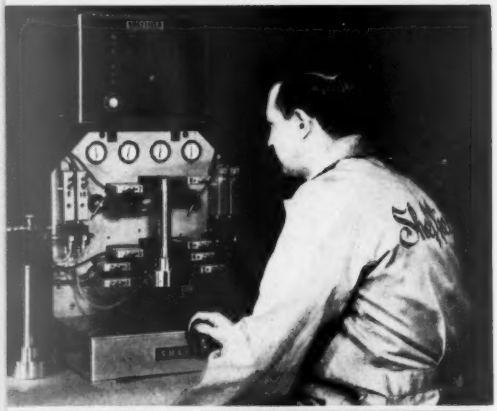
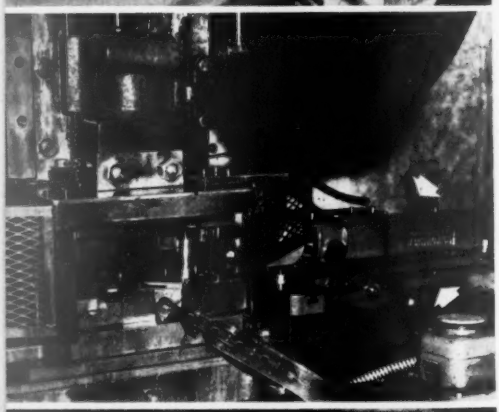


DIMENSIONAL GAGE . . .

A gage that inspects 13 dimensions simultaneously on a rear planetary carrier assembly is a recent development of the Sheffield Corp., Dayton 1, Ohio. Dimensions checked include two locations on four diameters, the inside depth at four places and outside height of the base. Parts can be checked at the rate of 600 to 800 per hour. Write for further data.
Inform-A-Gram No. A1.

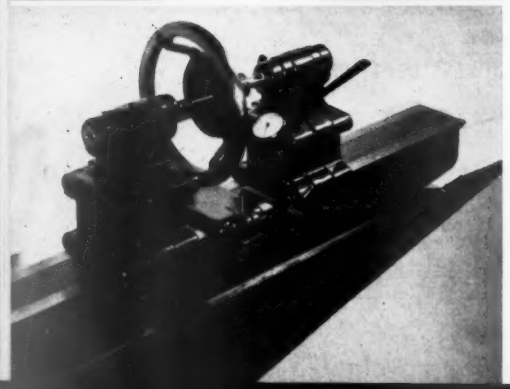


PUNCH PRESS FEED . . .

This Dickerman Rol-Di-Feed is a compact, self-contained cam driven feed which may be installed on the press bolster, in some cases directly on the die shoe to feed stock in any desired direction. It is well suited to feeding of deep drawing or forming dies. Literature is available from the H. E. Dickerman Mfg. Co., Springfield, Mass.
InformA-Gram No. A2.

STORING DIES . . .

An inexpensive hand-propelled crane with electric hoist is making the storage of dies in forging plants efficient and easy. Any die can be picked up or set in place by the use of the crane without disturbing other dies. The crane is a product of the Cleveland Crane and Engineering Co., Wickliffe, Ohio. Further data is available.
Inform-A-Gram No. A3.

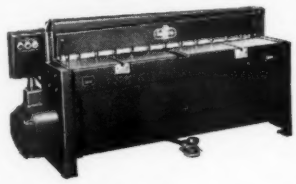


BENCH CENTERS . . .

Improvements in its bench centers has been announced by the Brown & Sharpe Mfg. Co., Providence, R. I. A typical set-up with the centers on optionally furnished raising blocks is shown in the illustration.
Inform-A-Gram No. A4.

SQUARING SHEARS . . .

An entirely new, redesigned squaring shear line, expanded to 18 models available in eight power-driven; six foot; and four air

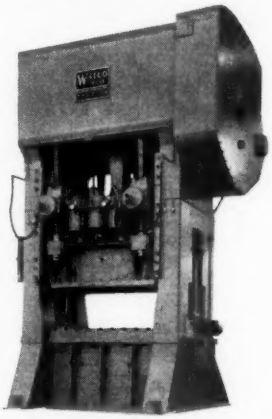


types, has just been announced by the Famco Machine Co., Kenosha, Wis. Capacities range from 20 to 14 gauge mild steel in 22″ to 72″ widths.
Circle Inform-A-Gram No. A5.

◆ ◆ ◆

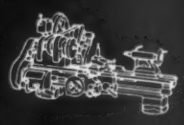
ADJUSTMENT DEVICE . . .

A hydro-pneumatic force adjustment device that acts as safety overload protection for the blankholder when applied to a double action press, has been developed by the Federal Ma-



chine and Welder Co., Warren, Ohio. This simple and compact unit also provides a means for adjusting the blankholder pressure independently at all four corners. Pressure up to the capacity of the device can be applied at any corner. Further data is available.
Circle Inform-A-Gram No. A6.

ON PARADE



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AUTOMATIC STOCK REEL . . .

Available in three sizes; 24", 30", and 36" platen, the Jaco automatic stock reel will operate with almost any type of coiled stock which fits the platen and weighs no more than 250 lbs. A new base for the 24" model changes the feed angle and allows the reel to take full advantage of the natural spring of the uncoiling stock, without the use of motors, belts or sprockets. The loop of stock between the coil and the press feed completely eliminates slippage, kick-back and over-run. Further information is available from Jaco Devices, Inc., 96 High St., Hingham, Mass.

Circle Inform-A-Gram No. A7.

◆ ◆ ◆

O.B.I. PRESSES . . .

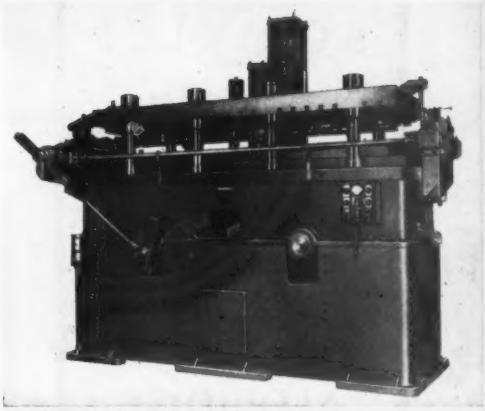
A new line of Niagara open back inclinable presses, (Series AA) featuring the electro-pneumatic clutch, is now being manufactured by the Niagara Machine & Tool Works., Buffalo, N. Y. Utilized for blanking, forming, drawing, perforating and in combination die and automatic feeding operations, the presses may be fed from either side or from the front or back. Catalog 57A gives complete details on the presses.

Circle Inform-A-Gram No. A8.

DIE PRESSES . . .

Multiple-crank progressive die presses that do one stamping job and eliminate the repeated handling associated with conventional presses have been developed by the Brandes Press Co., 6408 Euclid Ave., Cleveland 3, Ohio. There is, theoretically, no limit to the length of the presses; which are designed to add any number of double-crank combinations.

Inform-A-Gram No. A9.



CUSTOM WRENCHES . . .

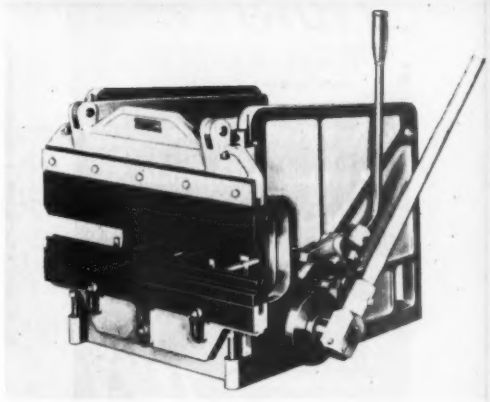
In the supplying of special wrenches for various equipment, where a stock wrench is not suitable, the Dayton Rogers Mfg. Co., Minneapolis 7, Wis., has developed a method of producing practically any type of box or open end wrench by a stamping procedure. The custom-made tools can be made in almost any size up to 20".

Inform-A-Gram No. A10.

HAND PRESS BRAKE . . .

A new 24" hand operated press brake rated at 8-ton capacity has been announced by the O'Neil-Irwin Mfg. Co., 626 Eighth Ave., Lake City, Minn. This machine is designed to relieve large production models of short run forming operations. It is compact enough to be quickly set up for use in experimental engineering and model shops.

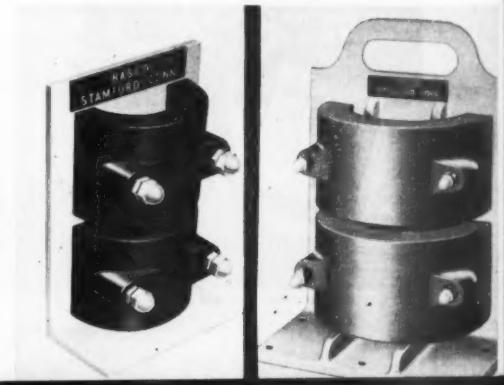
Inform-A-Gram No. A11.



SEPARATORS . . .

A new heavy duty magnetic separator which will automatically separate steel plates up to ¼" thick is available from the Basco Mfg. Co., 5 Woodside St., Stamford, Conn. The firm also has a midget separator (left photo) for light metal sheets.

Inform-A-Gram No. A12.



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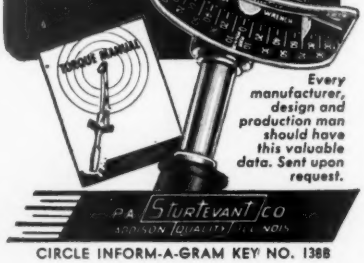
TORQUE WRENCHES
Read by Sight, Sound or Feel.

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch grams . . . inch ounces . . . inch pounds . . . foot pounds (All sizes from 0-6000 ft. lbs.)



Every manufacturer, design and production man should have this valuable data. Sent upon request.

P.A. STURTEVANT CO.
ADDISON (QUALITY) ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 138B

Fast, Safe Way To Clean Tools, Dies and Small Parts

FOUNTAIN BRUSH ACTION and CLEAN FILTERED SOLVENT

FOR THE TOOL ROOM MAINTENANCE & PRODUCTION

Grease and dirt flows away as operator brushes and clear solvent flows through brush bristles. No splashing. Fits on work bench or portable stand, 20" square. Has separate dip tank at rear.

OTHER GRAYMILLS CLEANING UNITS UP TO 300 GAL. SIZE
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CIRCLE INFORM-A-GRAM KEY NO. 138C

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Design Assistance Offered

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HARDNESS TESTING
has been done with the SCLEROSCOPE since 1907

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THE SHORE INSTRUMENT & MFG. CO., INC
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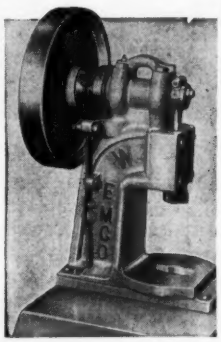
CIRCLE INFORM-A-GRAM KEY NO. 138E

EMCO "W", 5-ton bench type; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.



EMCO

Power Punch Presses Are Speedy and Safe

Versatile EMCO presses excel for punching, forming, stenciling and riveting metal, leather, plastics and other non-metallic materials. Up to 300 operations per minute. "Big machine" speed, strength, rigidity, accuracy, endurance. Compact, foolproof; simple design—easy to operate. Thousands of EMCOS in money-making use testify to Klaas dependability since 1921. Two practical sizes.

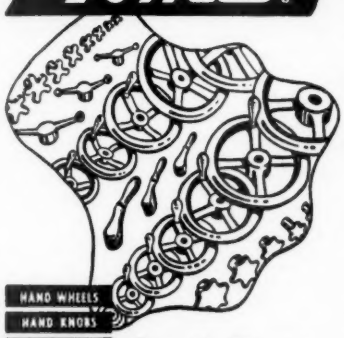
Ask for our Bulletin "T-6"

KLAAS MACHINE & MFG. CO.
4312 East 49th St., Cleveland 25, Ohio

— KLAAS BUILT —

CIRCLE INFORM-A-GRAM KEY NO. 138F

Tomco



Specify Tomco for long lasting dependability

A complete line of high grade hand knobs, handles, and hand wheels is available from Tomco. Immediate shipments are made from stock of standard items. Specialty items are made to your specifications.

For original equipment or replacement parts look to Tomco for quality and service.

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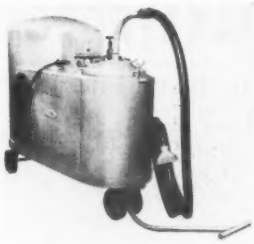
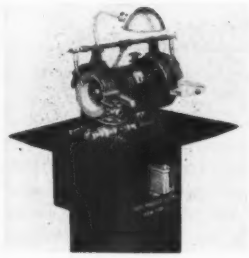
Tomco PRODUCTS CO.
1623 DOUGLAS AVE.
RACINE, WISCONSIN

Blank or Machined—from stock

CIRCLE INFORM-A-GRAM KEY NO. 138G

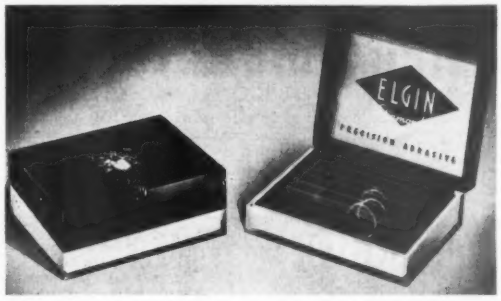
A New Portable Sump Tank Cleaner completely cleans out the sump tanks of grinders, lathes and other machine tools and will then clean the oil and return it to the sump. Write to the W. R. Carnes Co., Verona, Wis., for Catalog No. 123, or—
Inform-A-Gram No. A13.





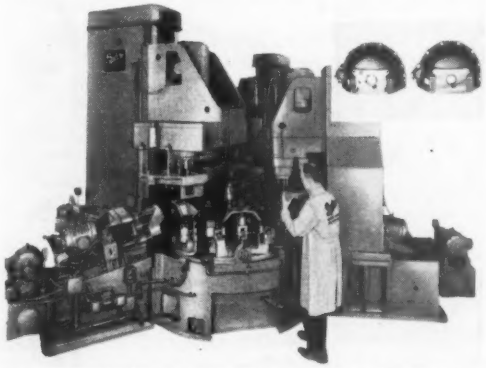
For Wet Grinding. A copious flow of water is delivered directly to the tool being ground; a separate motor driven coolant pump, pan and settling tank. These are features on the new precision grinder for wet grinding announced by Thomas Prosser & Son, 120 Wall St., New York, N. Y.
Inform-A-Gram No. A14.

Standard Comparison Slides which permit a quick check of diamond grade and purity are now available from the Elgin National Watch Co., Abrasives Division, Elgin, Ill. When used with a microscope, the slides will



permit examination of diamond particles in grades ranging from 1 micron to 100 mesh through comparison of the diamond power or compound with the diamond on the master slide. Complete information and prices will be sent upon request.
Circle Inform-A-Gram No. A15.

Flywheel Housings. A Buhr special machine is now processing two different models of flywheel housings simply by exchanging tools. The machine is a 5-way automatic, with a 6-station fixture, arranged with hy-



draulic clamping and mounted on a 60-inch-diameter automatic index station. Forty-two operations are performed on each flywheel housing at the rate of 100 pieces per hour. Further information is available from Buhr Machine Tool Co., Ann Arbor, Mich.
Circle Inform-A-Gram No. A16.

YESTERDAY'S PIONEER · · · TODAY'S LEADER

T-SLOT CUTTERS

• You can increase your production through the faster feed possible with these Weldon T-Slot Cutters.

They have far greater chip room than is usually found in a T-Slot Cutter. Their straight shanks fit Weldon Holders, and their initial cost is far less than taper shank type cutters.

Weldon Distributors throughout U.S.A. and Canada carry complete stocks to serve you.

WRITE FOR LATEST CATALOG NO. 10.

THE WELDON TOOL CO. Cleveland 4, Ohio
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CIRCLE INFORM-A-GRAM KEY NO. 139

FREE BULLETIN on SURFACE ROUGHNESS tells . . .

- **How to establish roughness specifications** for parts that are in production — and for parts of new design.
- **How to show roughness specifications** on drawings and shop prints.
- **Practical advantages** of surface roughness specification.

ALSO gives tips on MEASURING surface roughness in the shop—and briefly tells why most plants use the PROFILOMETER for doing this.

Write Today!

Ask for BULLETIN L21.

Profilometer is a registered trade mark.

MMCo MICROMETRICAL MANUFACTURING COMPANY

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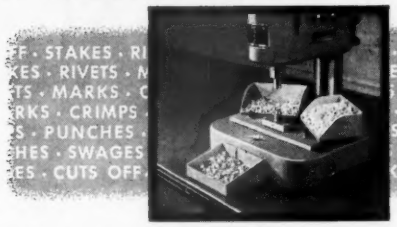
CIRCLE INFORM-A-GRAM KEY NO. 140A

ELECTROPUNCH stakes terminals to insulators TWICE AS FAST!



In this strict quality control operation at Cambridge Thermionic Corporation, ELECTROPUNCH — the all-electric impact hammer — has slashed production time *and unit cost* in half! Main reason for the speed-up: ELECTROPUNCH delivers instant, controlled impacts at a faster rate than the equipment previously used, *and* without requiring time to build up pressure! ELECTROPUNCH also *reduced spoilage* resulting from staking these ceramic insulators at inadequate or excessive pressures.

Delivers impacts up to 10,000 lbs. — up to 125 blows per minute! Economical to buy, operate and maintain.

Write, or phone Bigelow 4-6370 for folder showing complete line of Black & Webster tools.

BLACK & WEBSTER, INC.

Dept. 2, 445 Watertown Street, Newton 58, Mass.
Solenoid-operated Production Tools

CIRCLE INFORM-A-GRAM KEY NO. 140B

Notch 750 PIPE ENDS PER HOUR with ARC-FIT

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CLEAN NOTCHES
NO EXTRA FINISHING
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Standard ARC-FITS notch ½" to 2" pipe for "T" joints. Dies for each size. Immediate shipment.

Special ARC-FITS for angular cuts or larger sizes. Send drawing and material specification for quotation.

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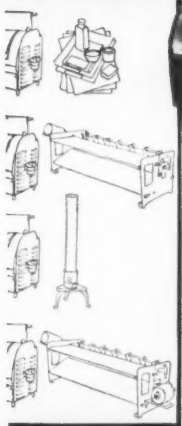
CIRCLE INFORM-A-GRAM KEY NO. 140C

AMAZING! the Time and Money Saved WITH Spee-Dee WHITEPRINT OUTFITS



Make Exact Duplicates in as little as One Minute at less than 2c sq. ft.

Inexpensive and simplest of all print making equipment! Thousands in daily use. Enables anyone to make accurate, positive whiteprints from translucent originals. Saves up to 80% of commercial blueprint costs—quickly pays for itself! Makes photocopies, too. Just plug in. Uses diazo (moist or ammonia dry) process. Complete portable *Spee-Dee* outfits in 12" x 18", 18" x 24" and 24" x 36" models. Prices start at $55.00. Also a full line of 42" width capacity volume production whiteprinters at moderate prices.

10 DAY FREE TRIAL

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Mfrs. of Whiteprint, Blueprint & Photocopy Equipment

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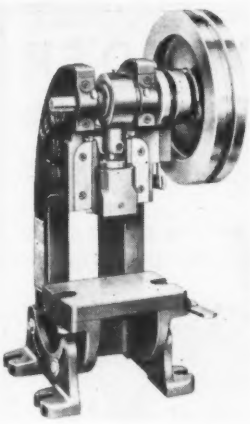
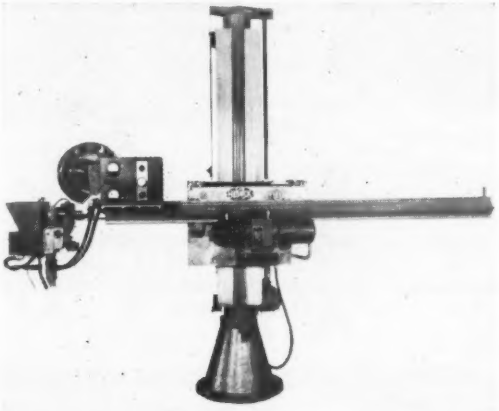
CIRCLE INFORM-A-GRAM KEY NO. 140D

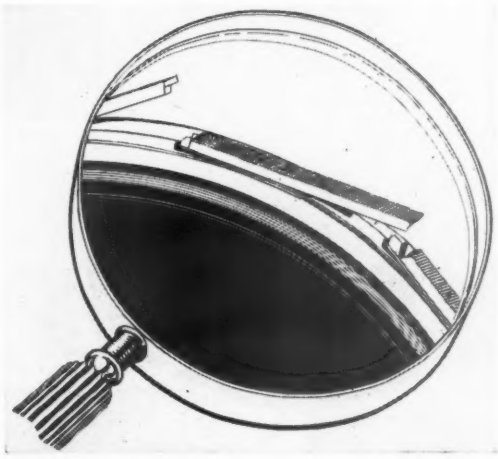


One-half Ton Midget Press. A precision built midget punch press has been put on the market by the Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, Calif. This press is open-back and inclinable. All parts are made extra heavy to insure longer life and trouble-free operation. Kenco feels it has opened a complete new phase of lightweight power press operations with this new machine. The unit has a ¾" standard stroke with 1"optional. Further information is available. **Inform-A-Gram No. A17.**

Automatic Welding Fixture. For cost conscious companies that are doing or contemplating automatic welding, here is a completely flexible fixture. This ram type

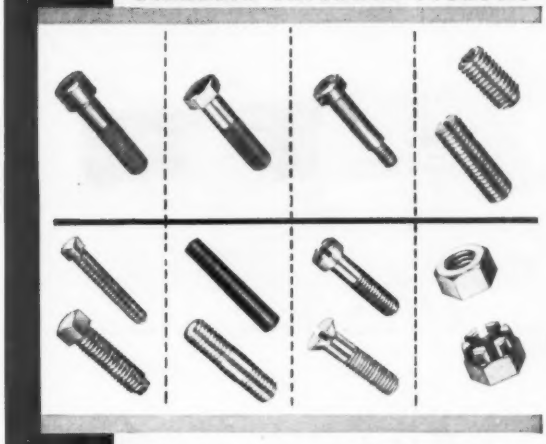


machine features ruggedness, precision and versatility and is designed to produce faster, better and lower cost automatic welding. Further information is available from the C. B. Herrick Mfg. Corp., 1935 Euclid Ave., Cleveland 15, Ohio. **Circle Inform-A-Gram No. A18.**



File Band. Adaptable to new production techniques, and incorporating new file segment joint design, a file band is being made available as a replacement item. A brochure listing all types will be sent to those requesting by the Boice-Crane Co., 963 Central Ave., Toledo 6, Ohio. **Circle Inform-A-Gram No. A19.**

Cut **Assembly and Production Costs with "CHICAGO" Standard Threaded Products**



For whatever purpose, production or maintenance, "Chicago" Threaded Products for 82 years have been precision made to assemble faster with less "on the job" trouble.

Specify standard sizes for faster deliveries, greater savings over "specials" and less downtime. Our more complete stocks mean "at once" shipments when you need them—no production delays—no maintenance "shut downs"—no large inventories necessary.

The "Chicago" line of threaded products is a complete line, available from the stocks of your service-conscious Industrial Supply dealer—in bulk or in packages for original equipment or replacement. Ask him for samples—he will gladly supply them.

This new 36-page catalog tells the whole story of the "Chicago" complete line of threaded products. Ask for your copy today.

All "Chicago" Screw Products come packed in strong, easier-to-see packages. Color coded labels mean faster selection, greater savings of time in your stockrooms.

HIGHLIGHTS OF THE "CHICAGO" LINE:

★ High Carbon Heat Treated Cap Screws give added wearing qualities due to uniform hardness through entire thread structure. Ideal for all heavy-duty equipment.

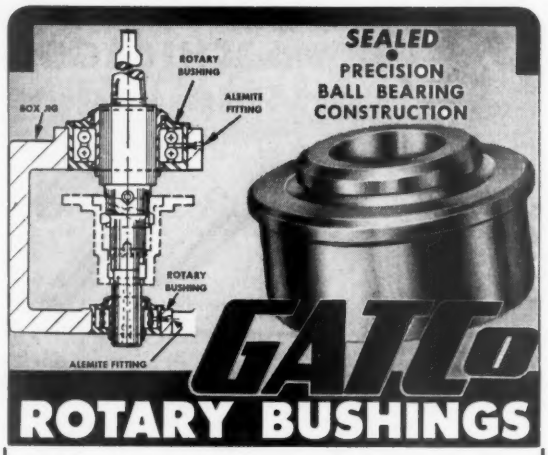
★ Larger size Hexagon Head Cap Screws than normally stocked are available for immediate shipment.

★ Anti-corrosive "Chicago" stainless steel and brass fasteners in a large range of sizes and styles available for immediate shipment.

The CHICAGO SCREW COMPANY
2519 W. Washington Boulevard
Bellwood, Illinois

"SAFETY PLUS" Socket Set Screws, alloy and stainless • Socket Head Cap Screws, alloy and stainless, Flat Head, alloy • Socket Head Stripper Bolts • Socket Pipe Plugs • Square Head Dog Point Set Screws • Socket Keys and Key Kits • "CHICAGO" Hexagon Head Cap Screws, bright, heat treated, stainless and brass • Square Head and Headless Set Screws • Fillister and Flat Head Cap Screws • Milled Steel Studs • Hexagon Nuts, steel and brass • Castle Nuts • Taper Pins

CIRCLE INFORM-A-GRAM KEY NO. 141



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DRILLING
CORE DRILLING
ROUGH
AND
FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

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Telephone PLYMOUTH 1472

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WILDER
PROJECTOR
The MICRO-PROJECTOR
with the
VERTICAL
DESIGN
• New Gage Company Precision Plastic Comparator Charts made on non-changing, unbreakable material; available for 360° angular checking, radii, threads and special charts to your specifications. • The Wilder so equipped will inspect faster, more accurately, without the need of to-scale manually built drawings.
Economy • Accuracy • Moderate Price
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200 -T LAFAYETTE STREET • NEW YORK 12, N. Y.

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TOOLS
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DIES
Many times more durable than steel, Talide Metal adds years of life to the wearing edges of tools, dies, machinery and equipment.
Hard as a diamond and almost indestructible, it triples output per man and per machine.
For good service and recommendations for improving any cutting, drawing or wear-resistant application, send particulars to Metal Carbides Corp., Youngstown 7, Ohio. Write for Catalog No. 54-G
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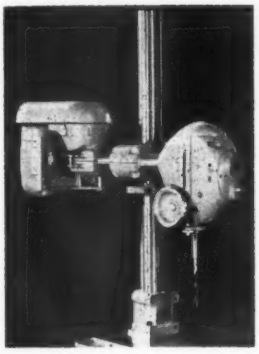
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

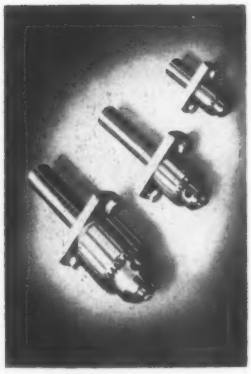
CIRCLE INFORM-A-GRAM KEY NO. 142C

Hardness Testing. This portable bench type instrument combines a positive controlled diamond penetrating action with a high power microscope of 400 magnifications. For detail information on the hardness testing machine, write to George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y., or—
Inform-A-Gram No. A20.

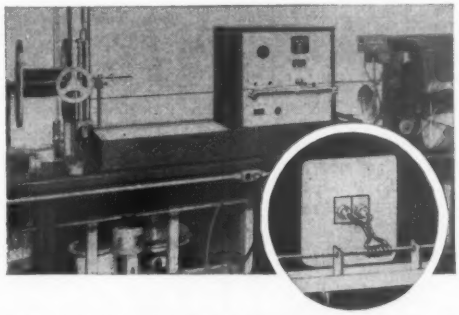


This Lead Screw Tapper comes with a pre-wired reversing starter and controls complete with two-way selector switch for "drill" and "tap." The control plate mounts under the front cover of the head assembly. The lead screw tapper has a 3½" depth stroke and is available in standard leads —10 to 32 pitch. It is made by the Magna Engineering Corp., Menlo Park, Calif. **Inform-A-Gram No. A21.**

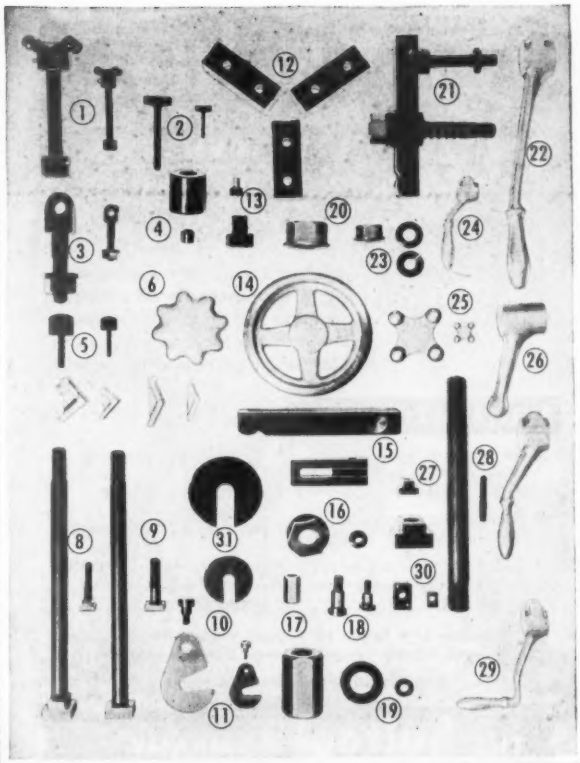
Chuck-Type Floating Holder. Accurate alignment of drills, reamers, counter bores and similar tools is quickly accomplished with Barnaby Chuck-type floating holders. They are finished by the Du-Lite process to assure rust-resistance and provide active longer life. The finish reportedly will never chip, peel, crack or blister. For further information consult the Barnaby Manufacturing Company, 74 Knowlton Street, Bridgeport, Conn. **No. A22.**



Portable Induction Heating Unit. To bond together the individual strands of multi-strand wire and cable to prevent the ends from becoming frayed or loose, a tube operated induction heating unit has been developed by



Lepel High Frequency Laboratories, Inc., 55th St. & 37th Ave., Woodside, New York, N. Y. Set-up for the automatic bonding, stripping and cutting is shown in the above photograph. The insert shows an enlarged view of the coil arrangement with the insulated wire passing continuously through the heating coil.
Circle Inform-A-Gram No. A23.



OVER 500 JERGENS STANDARDS SAVE TIME--LABOR--⅔rds THE COST

Illustrated above are just a few of the more than 500 Jergens Standard Jig & Fixture Components. One of the most complete lines in production today, mass-produced Jergens Standards save you the skilled tool and die room help necessary for the custom making of component parts in your own shop. Keyed to the photograph and listed below is a brief description of a number of these items now immediately available from stock. Write for descriptive catalog and price list.

1. Clamp Shoe Assemblies—14 sizes—alloy steel screws—hardened steel shoes with snap ring lock.
2. Thumb Screws—4 sizes—3 lengths each size.
3. Latch Screws—4 sizes—hardened.
4. Jig Rest Buttons—4 sizes—hardened—ground.
5. Quarter Turn Screws—9 sizes—soft steel.
6. Palm Grip Hand Knobs—with reamed, tapped, or square hole.
8. Tee Slot Bolts—standard sizes ⅜" to 1" —various lengths.
9. Tee Bolts—standard sizes ½" to ¾"—various lengths.
10. Shoulder Screws—for use with swing "C" washer.
11. Swing "C" Washers—4 sizes—comes with shoulder screw.
12. Blank Soft Chuck Jaws—19 standard sizes—S.A.E. 1020 Steel—in stock to fit approximately 273 master chucks at a moment's notice—special blanks made on request.
13. Rest Buttons—4 sizes—hardened—ground.
14. Hand Wheels—4 sizes 6" to 12" in diameter—aluminum alloy.
15. Strap Clamps—hard and soft—plain or with radius.
16. Flange Nuts—9 sizes—hardened.
17. Extension Nut Couplers—8 sizes—alloy steel.
18. Shoulder Screws—24 sizes—Hex head socket—160,000 to 180,000 P.S.I.
19. Plain Flat Washers—8 sizes—hardened—ground.
20. Spherical Flange Nuts—9 sizes—hardened—ground.
21. Strap Clamp Assemblies—comes with spherical flanged nut assembly or hand knob for clamping the strap.
22. & 24. Offset Handles—aluminum alloy or malleable casting.
23. Spherical Washers—hardened—ground.
25. Hand Knobs—aluminum alloy casting.
26. Clamping Levers—aluminum alloy or malleable casting.
27. Tee Nuts—14 sizes—hardened.
28. Studs—stress-proof steel.
29. Crank Handles—aluminum alloy or malleable casting.
30. Fixture Keys—(hard or soft)—ground.
31. "C" Washers—22 sizes—4, 5, and 6 diameters each size—ground.

Jergens METER TOOLS AT LOWER COST
TOOL SPECIALTY CO.
712 E. 163rd ST., CLEVELAND 10, OHIO

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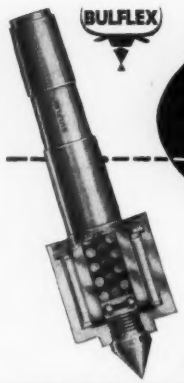

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★ ACCURATE
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★ LIGHTWEIGHT

Corrects out-of-roundness, waviness, chatter . . . Generates diametric size within .0001" tolerance . . . Hones all parts from ½" to 2½" in diameter—regardless of length or material . . .

Can be used on any lathe, drill press, electric drill . . .

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Removes a few "tenths" or a few "thousandths" stock in less time than it takes to re-center, indicate a part, and dress an abrasive wheel.

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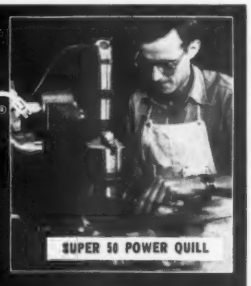
LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION



UP TO 45,000 R.P.M. AND ¼ H.P. ON AC/DC. Only PRECISE has the speed, power and precision needed to turn *Tungsten Carbide Mills* as well as all other rotary tools with shank diameters to ¼". Grind, mill, finish, polish any material from wood to the hardest alloy steel. MODELS SUPER 30 and SUPER 40 are for hand applications or machine set-ups; PRECISE SUPER 50 is for heavy duty in machine set-ups. Precision quills and chucks; lifetime-lubricated, micro-precision bearings; machined metal housings. Mounts and accessories for each model extend versatility on standard machine tools.

New

PRECISE SUPER 30
45,000 R.P.M.
and ⅛ H.P. in 35 oz. Draw collet.

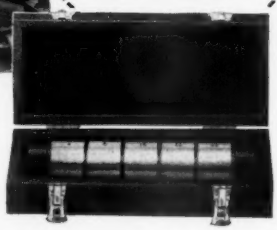
Write FOR CATALOG

PRECISE PRODUCTS CORP. 1341 Clark St., Racine, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 144C

Check Surface Roughness Waviness and Lay INSTANTLY
. . . Right At The Machine

With ACME'S ROUGHNESS COMPARISON SPECIMENS



Consists of various surface specimens, *individually finished* to definite micro-inch readings, grouped together in one handy comparison bar. Merely hold bar opposite work for fast, visual comparison check of surface roughness, waviness and lay.

Available in groups of 3, 5 and 8 specimens. Low cost. Write for details, now!

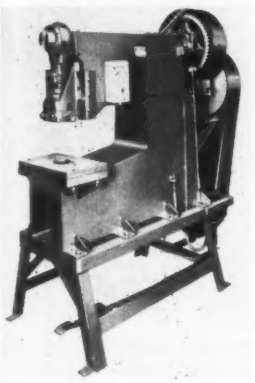
Mfr's. of Drill Jig & Fixture Bushings

ACME INDUSTRIAL COMPANY

206 N. Laflin St. Chicago 7, Illinois

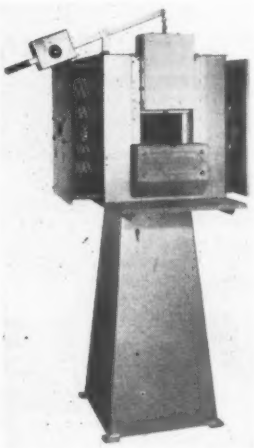
THE SERVICE SHOP TO INDUSTRY FOR OVER A QUARTER CENTURY

CIRCLE INFORM-A-GRAM KEY NO. 144D



A New 40-Ton Deep Throat Power Punch Press has been added to the line of machines manufactured by the Whitney Metal Tool Co., Rockford, Ill. Other significant specifications of this new press are 24" throat depth, 12" throat height, 84 strokes per minute, 2½" stroke length, 9" maximum die space, bolster plate 12" x 20" x 1½" and a 3 hp motor. Weight of the machine crated is 4,110 pounds. Further data is available. **Circle No. A24.**

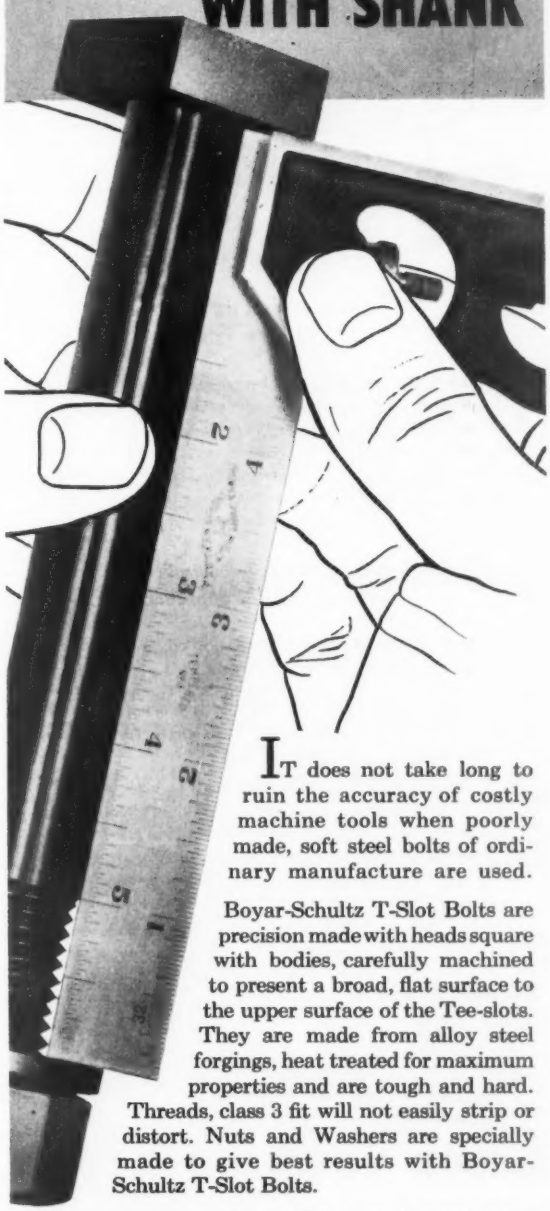
Furnace Improvements. The Sentry Co., Foxboro, Mass., announces improvements in its Model Y high speed steel hardening furnaces. Some of the improvements are a heavy welded plate base for greater floor support; close regulation of heat at operating range; rapid heating to desired temperature and generally greater operating economy. The furnaces are designed for continuous operation at temperatures up to 2500° F. Silicon carbide resistors located above and below the one-piece silicon carbide muffler supply the heat. Further information is available. **Circle No. A25.**



A New Electronic Gage Head features axial or side action, precise and rugged construction, light gaging pressure and magnifications variable from 100 to 5,000.

The illustration shows two types of gage heads mounted in a gear tester with recorder and graph representing gear errors. Further information can be obtained from the Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. **Circle Inform-A-Gram No. A26.**

Boyar-Schultz
T-SLOT BOLTS
HEADS ARE SQUARE WITH SHANK



IT does not take long to ruin the accuracy of costly machine tools when poorly made, soft steel bolts of ordinary manufacture are used.

Boyar-Schultz T-Slot Bolts are precision made with heads square with bodies, carefully machined to present a broad, flat surface to the upper surface of the Tee-slots. They are made from alloy steel forgings, heat treated for maximum properties and are tough and hard. Threads, class 3 fit will not easily strip or distort. Nuts and Washers are specially made to give best results with Boyar-Schultz T-Slot Bolts.

When compared with refinishing and trueing the bed of a machine tool, the cost of GOOD bolts is trifling.

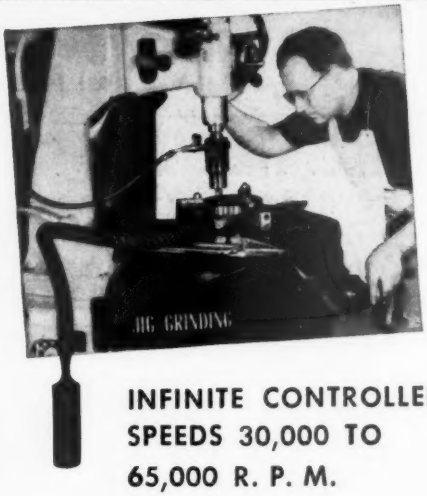
Write for Free Catalog

BOYAR-SCHULTZ CORPORATION

2112 Walnut Street Dept. D-B Chicago 12, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 145

JIG GRINDING ACCURACY *guaranteed**



INFINITE CONTROLLED SPEEDS 30,000 TO 65,000 R. P. M.

Easily connect jig grinder to jig borer or mill

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 6 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3⅝" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.

*Dependably accurate to "tenths"

Vulcanaire
It's built by toolmakers for toolmakers

MAJOR VULCAN SERVICES

Engineering, Processing, Designing and Building, Special Tools . . . Dies . . . Special Machines . . . including the *Vulcan Hydraulics that Form, Pierce, Assemble and Size.*

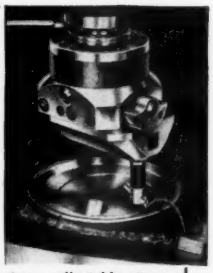
VULCAN TOOL CO.
PRITZ STREET • DAYTON 10, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 146A

ONE Tool
ONE Set Up

. . . for boring, facing, turning, recessing, undercutting.

MASTERHEAD
THE BORING AND FACING HEAD THAT THINKS FOR ITSELF



Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; nine models for work up to 36¼" diameter.

Send for Illustrated Literature

KARL A. NEISE 404-4th Ave., Dept. TP. New York 16, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 146B

REVOLUTIONARY! NEW!

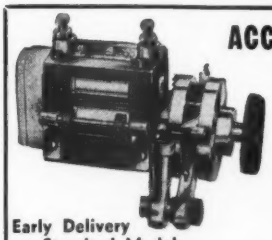
KRASBERG UNIVERSAL AUTOMATIC STOP . . . *can be used on any die!*

INSTALLED IN MINUTES!
SIMPLY MOUNT TO FRONT OF STRIPPER WITH TWO SCREWS — THEN DRILL HOLE FOR ARM AT GAGING POSITION.

Also Mfgrs. of Quality Tools, Dies, and Metal Stampings. WRITE TO:

R. KRASBERG & SONS MFG. CO.
2501 W. HOMER ST. — CHICAGO 47, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 146C



ACCURACY with SIMPLICITY and LOW COST with "RFC" ROLL FEEDS

Models to fit:
ANY PRESS
FOR ANY JOB
FOR STOCK UP TO 12" WIDE

Early Delivery on Standard Models

"RFC" ROLL FEEDS are quality built for long, dependable service.

Write for descriptive literature TODAY

ROLL-FEEDS CORPORATION
Pawtucket, Rhode Island
An Electrix Affiliate

CIRCLE INFORM-A-GRAM KEY NO. 146D

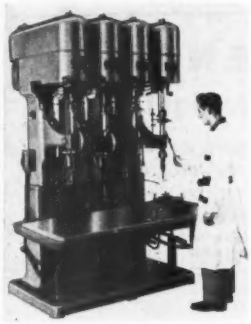
Expanding Mandrels

Accuracy 001" - No Distortion
No Slipping - Everlasting

K.O.LEE CO.
ABERDEEN, SOUTH DAKOTA

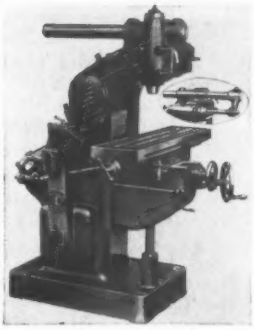
If it's made by **Lee** *it's a* **"Knock-Out"**

CIRCLE INFORM-A-GRAM KEY NO. 146E

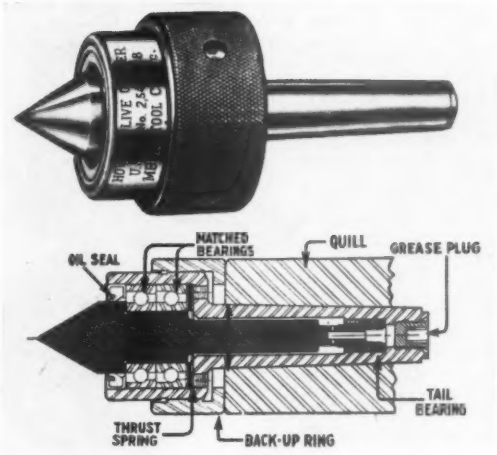


This Variable Speed Drilling & Tapping Machine features infinitely variable speed selection to meet many job requirements. It has power feed on the first two spindles, hand feed on the third and reversing motor tapper on the fourth. For complete details and specifications write to the Edlund Machinery Co., Cortland 38, N. Y., for Bulletin 140, or— **Inform-A-Gram No. A27.**

Milling Machines. Ball Machinery Co., 715 W. Lake St., Chicago, Ill., has been appointed Midwest distributor of Abene combination vertical and horizontal milling machines which are imported from Sweden. These machines feature a moveable ram which enables the operator to set the spindle for vertical, horizontal or angular milling. For complete information, regarding the machines, write direct to Ball Machinery, or— **A28.**



"SESCO" Cam Clamps offer the advantage of maintaining positive holding pressure and secure clamping action even on such varying stock thicknesses as are found in castings and forgings. The clamps are of rugged all-steel construction with all working surfaces machined to close tolerances and hardened. Literature and tracing templates are offered by Special Engineering Service, Inc., 8161 Livernois Ave., Detroit 4. Mich. **A29.**



Howard Live Centers feature back up rings to assure positive rigidity. All models and sizes have full length solid spindles. For further data write to the Melin Tool Co., 3371 W. 140th St., Cleveland 11, Ohio, or— **Circle Inform-A-Gram No. A30.**

Let us Prove . . .
★ Faster cutting, even on hardened steel or abrasive surfaces!
★ Superior finishes!
★ Increased production and reduced tool costs!

Job-engineered for greater production profits!

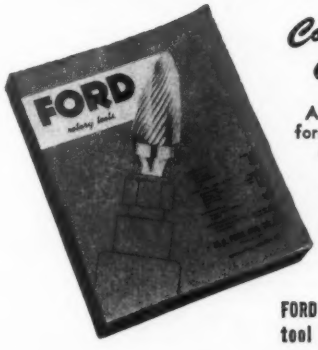
FORD

solid CARBIDE END MILLS

On-the-job tests of FORD solid carbide end mills confirm their superiority! Greater rigidity, job-engineered spiral flutes and cutting edges, and close tolerances all contribute to faster, better production and lower costs. Sizes to 1/2". See new catalogue No. 207.

FORD -- *the complete line!*

HSS ground cutters, rotary files, countersinks
CARBIDE cutters, end mills, grinding burs



Complete Details, Operating Data

All specifications, plus informative operational data on more than 300 FORD stock rotary tools contained in new FORD catalogue No. 207, just released. Send for YOUR copy.

FORD regrinding service adds new tool life, reduces tool costs!

M. A. FORD MFG. CO., INC.

Pioneers in rotary tools for more than 30 years

DAVENPORT 1, IOWA

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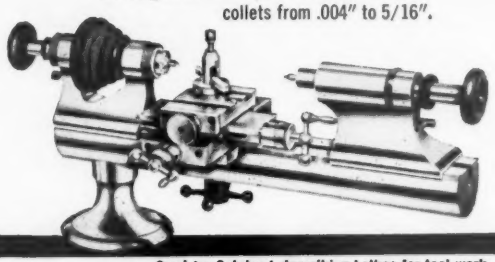
SMALL INSTRUMENT PARTS ARE MADE BEST
ON LEVIN® LATHES

Twenty-three models for all types of work. 4" swing, Bed Length 12" or 18"; over 100 stock sizes of collets from .004" to 5/16".



Send for Catalog L describing Lathes for tool work, second operations; turrets and full line of accessories.

LOUIS LEVIN & SON, INC., 3610 S. BROADWAY, LOS ANGELES 7, CALIF.

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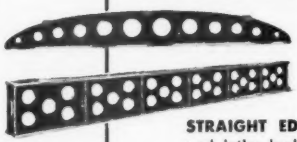
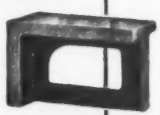
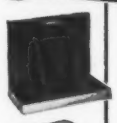
CHALLENGE
Surface Plate Equipment



MADE OF HIGH-GRADE SEMI-STEEL — HEAT TREATED AND PRECISION GROUND



STRAIGHT EDGES — For scraping planer and lathe bed ways . . . parallel straight edges for inspection of alignment and bearing surfaces of machine tools.



RIGHT ANGLE IRONS — May be placed in almost any position with work clamped to face for measuring . . . Also used as height blocks.

ANGLE PLATES — Made in 22 sizes from 2¾ x 4¾ x 4¾ up to 24 x 24 x 24 for clamping and holding work.

V-BLOCKS — Feature ribbed sides, light weight and a V accuracy of .0005 inch . . . for supporting shafts for drilling, checking, etc.

BOX PARALLELS — Complete range of sizes for every use . . . Accurate to .0005 inch.

Send for complete information

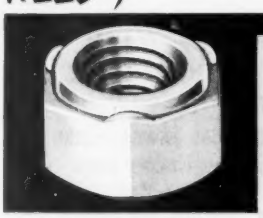
THE CHALLENGE MACHINERY COMPANY
Office, Factories and Show Room:
Grand Haven, Michigan

730

Challenge
TRADE-MARK ®

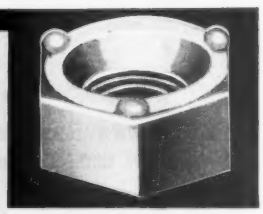
CIRCLE INFORM-A-GRAM KEY NO. 148B

WHEN YOU NEED a nut for blind assemblies or extra threaded depth, use one of these 2 WELD NUTS



Gripco Pilot-Projection Weld Nut

Circular pilot designed for quick, easy positioning of nut over bolt hole for instant resistant welding. No jigs, no fumbling, no waste of time. Furnished with or without famous Gripco locking feature.



Gripco Countersunk Weld Nut

Eliminate time-wasting retapping of nuts after welding. Exclusive countersunk nut bottom does away with fouling of nut threads by weld spatter. Available with or without Gripco locking feature.

Gripco weld nuts are proud members of the Gripco Lock Nut family that has for 50 years provided positive holding action for quicker fastening application at less cost. Also included in the Gripco line: Gripco Lock Nuts, New Gripco "Clinch" Nuts, Gripco Hi-Nuts in all standard sizes. For any fastening problem, look to Gripco first. Write for samples and full details.

108

GRIP NUT COMPANY
"after 50 years still holding strong"
308 W S. MICHIGAN AVE., CHICAGO 4, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 148C

TAP BREAKAGE Reduced

The DAHLSTROM TAP GUIDE practically eliminates tap breakage and saves wasted hours getting broken taps out of expensive dies. It does the job in a jiffy with work always straight and true. Carry it over to your big work, or fasten it to a post, slip a Tap Adaptor into the spindle, and even an inexperienced operator can handle it. Equipped with 9 adaptors, ranging from 8-32 to ¾". Spindle has center in top end to go in tail stock of lathe. Or use it as a tap extension for hard-to-get-at-places.

Write for Circular

$59.50 F.O.B. FACTORY

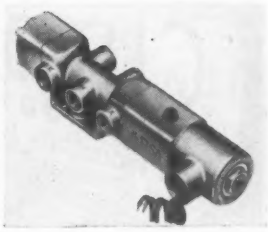
for HAND TAPPING or LATHE USE

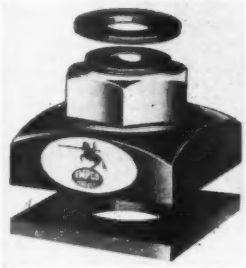
BRANCH MFG. CO.
NORTH BRANCH, MINNESOTA

Dahlstrom TAP GUIDE

CIRCLE INFORM-A-GRAM KEY NO. 148D

Four-Way Solenoid Valves. Electrical operation of 2, 3 and 4-way valves in ⅛ thru ½ NPT sizes, manufactured by Versa Products Co., Inc., 249 Scholes St., Brooklyn, N. Y., is now possible. Details are included in fully illustrated catalog now available.
Inform-A-Gram No. A31.

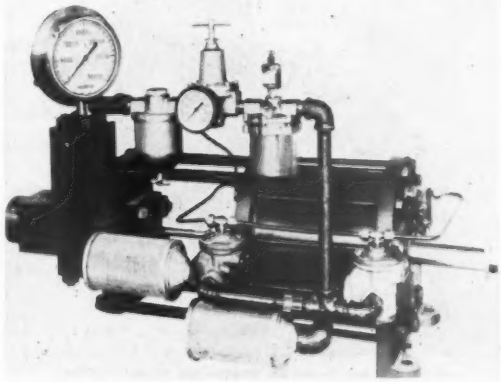




Machine Leveling Jacks which allow greater compensation for any unevenness of floors are now being produced by the Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit 12, Mich. The jacks come in three sizes. Literature available.
Inform-A-Gram No. A32.

This Hand Air Turbine Grinder & Miller is full of cost and time cutting features. It comes in three sizes to perform grinding, milling and polishing operations at speeds to 85,000 rpm, 70,000 rpm and 55,000 rpm. Its air driven turbine provides an unusually wide range of spindle speeds designed for use with tungsten carbide, high speed steel burs, precision grinding points, abrasive and diamond impregnated wheels. This machine is available from Newage International Inc., 235 E. 42nd St., New York 17, N. Y. Descriptive literature and price list will be sent upon request. **A33.**

This Air Driven Hydraulic Pump is a simplex horizontal type and meets the demand for small volume capacity at medium and high pressures. It develops up to 20,000 psi operating on 90 psi air supply; is a self-contained machine complete with air filter, regulator, lubricator and hydraulic pressure gage, and can be operated wherever air pressure is available. Further information can be had by writing to the Aldrich Pump Co., Allentown, Pa. **Circle Inform-A-Gram No. A34.**



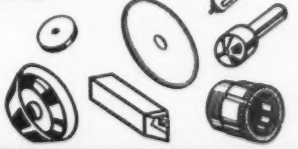
fact:

nothing in the world is as hard as a diamond

FACT: *in grinding carbides* — nothing cuts as fast, as cool and as economically as a diamond wheel.
FACT: *in drilling* — diamond bits give lowest cost per foot in hard geological formations.
FACT: *in dressing grinding wheels* only diamond dressers will do the job where fine finish, high production or intricate forms are involved.
FACT: *in wire drawing* — diamond dies assure accurate sizing, bright finish and high output.
FACT: *in lapping* — diamond compounds and powders save countless skilled man-hours by producing wanted sizes and finishes faster.
FACT: *in cutting* — diamond cutting and boring tools are standard for tough jobs where the best of competitive materials fail.
FACT: *in sawing* — diamond saw blades feature speed and economy on quartz, concrete, stone, sapphire, glass and diamond.
FACT: **Diamond Tooling gives you precise production, more production, uninterrupted production, *lowest cost production.***

IT IS A FACT . . . THERE IS NO ECONOMIC SUBSTITUTE FOR DIAMONDS

News Note: there is not a shortage of industrial diamonds. Learn the detailed facts about this wonder material. Write today for specific information and free booklet, "The Diamond That Pays For Itself."



INDUSTRIAL DIAMOND ASSOCIATION OF AMERICA, Inc.
124 East 40th Street, New York 16, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 149

Use KIPP AIR GRINDERS if you want to GRIND —not just rub!

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. Every mechanic knows this, but inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

Buy Kipp air tools for best results, lower prices.

MADISON-KIPP CORP.
212 Waubesa St., Madison, Wis., U.S.A.

- Skilled in DIE CASTING Mechanics
- Experienced in LUBRICATION Engineering
- Originators of Really High Speed AIR TOOLS

CIRCLE INFROM-A-GRAM KEY NO. 150A

CUT QUOTES
UP TO 30% ON PRODUCTION TURNING AND GRINDING OPERATIONS
FOR HIGHER PRODUCTION

- Eliminates Driving Dog
- Whole length of workpiece can be machined in one pass
- Machine need not be stopped between workpieces
- Workpiece end need not be square or flat

Available from stock in Morse Tapers 2 to 6 for 9/16" diam and up

Our New
DRIVING CENTER
(Pat. Applied for)
is revolutionizing any work done between centers by replacing the driving dog with a driver on the end of the workpiece. Thus, the hazard, fatigue, whip, bow, and vibration caused by driving dogs are eliminated, and the work quality is greatly raised.

Write
ZEE-HAWK
MACHINE SPECIALTIES, INC.
3716-20 W. MONTROSE AVE.
CHICAGO 18, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 150B

Drill More Holes Per Hour
In ANY Pattern . . .
On ANY Drill Press

with a *Adjustable* MULTI-DRILL

DRILLS 2 to 8 HOLES at ONE STROKE

Increase production up to 800% . . . save time, cut costs. MULTI-DRILLS make *any* drill press produce *more*. Attached without alterations or special tools. Quick, easy setups of universally adjustable spindles give you more flexibility . . . wider application. Handles any hole pattern within 9" circle; centers close as ½". Extension Spindles available to increase working area to 22½". Special adaptations available.

model 900

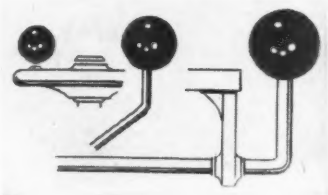
DRILLS ANY HOLE PATTERN

See your Commander Distributor for complete details. Write for the NEW Commander Full Line Catalog #851.

COMMANDER MFG. CO.
4228 W. Kinzie St. • Chicago 24, Illinois
Product of *Commander* . . . Builder of Production Tools

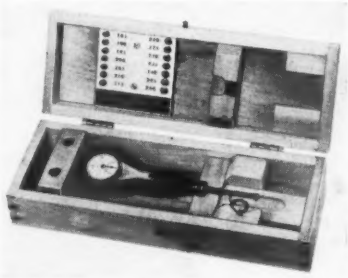
CIRCLE INFORM-A-GRAM KEY NO. 150C

Plastic Ball Lever Knobs have been added to the line of standardized components available from the Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland, Ohio. They



can be used as knobs on clutches, gears and levers on machine tools. They are good thermal insulators, offer good insulation against electric shock and have good resistance to heat and flame.
Circle Inform-A-Gram No. A35.

Dial Bore Gages for bores as small as 3/16" and ⅛" have been announced by Standard Gage Co., Inc., Poughkeepsie, N. Y. One bore gage



covers from ¼" down to 3/16" and is designated as #000. The other one, designated as #0000, covers from 3/16" to ⅛". Write to Standard for further information, or—
Circle Inform-A-Gram No. A36.

Brightboy Rubber-Cushioned abrasives are now compounded with either silicon carbide or aluminum oxide in an extensive variety of abrasive grain sizes ranging from extra

coarse to extra fine. Full details may be obtained from the Brightboy Industrial Div., Weldon Roberts Rubber Co., 6th Ave., and N. 13th St., Newark 7, N. J.
Circle Inform-A-Gram No. A37.

NOT JUST CARBIDE TIPPED . . .

R. B. Carbide Tools now come with HEADS of SOLID CARBIDE. Same price but longer tool life!

SEE THE DIFFERENCE

Immediate Delivery from Stock:
Boring Tools, Facing Tools, Threading Tools, for min. boring diams. from ⅛" up.
Write for FREE Catalog.

IN CANADA:
CANADIAN M. S. E.
171 Kipling Avenue South
Toronto 18, Ontario

R.B. TOOL Co., Inc. 785 North Broadway White Plains N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 151A

Steelmobile SIMPLIFIES and SPEEDS

✓ HANDLING
✓ TRANSPORTATION
✓ FEEDING of metal strip and bar stock to punch presses, shears, screw machines, etc.

TOP IS ADJUSTABLE
Can be positioned to suit machine heights

ELIMINATES EXTRA HANDLING
JUST ROLL STOCK TO MACHINES . . . and start feeding
No Unloading

Gives Your Shop "Assembly Line" Efficiency
Just load strip and bar stock on Steelmobile, roll to machines and feed. No transferring. One man can easily maneuver up to 2000 lbs. Saves labor, speeds production, cuts costs. Quickly pays for itself.

Representatives Wanted

JARKE MANUFACTURING COMPANY

Write For Details
5407 N. Broadway
Chicago 40, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 151B

"I don't care if they are our most important asset. You can't fill this safe with your MOLITE High Speed form tools."

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

TOOL COLUMBIA STEELS

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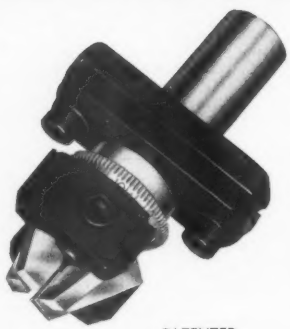
KUTMORE ADJUSTABLE HOLLOW MILLS

NEW! available NOW!

The Midget Floating Holder Hollow Mill, flange type, with micrometric adjustment, designed to permit easy compensation for any spindle misalignment.

WRITE TODAY FOR CATALOGUE No. 20TD

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.



PATENTED

CARL WIRTH & SON, INC. 1625 CLINTON AVE. NO. ROCHESTER 5, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 152B

Specify DESTACO SHIM STOCK

Made from selected steel or brass, rolled to precision limits, oiled to resist stain and rust, free from burrs. Twelve assorted thicknesses .001" to .015", sheets 6" x 12", coils 120", identified every 6" by thickness and amount remaining on roll.

DESTACO DETROIT STAMPING COMPANY

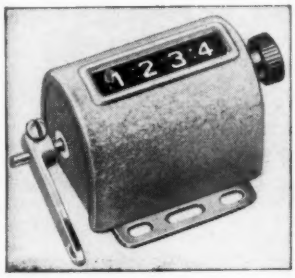
344 MIDLAND AVENUE • DETROIT 3, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 152C

This Portable Bar Stock Rack simplifies storage and handling. With this unit, one man can easily, with a hoist, pick up and stack heavy, unwieldy bar stock, tubing miscellaneous structural shapes, neatly and safely. For complete details, write Jarke Mfg. Co., 5407 N. Broadway, Chicago 40, Ill., or —

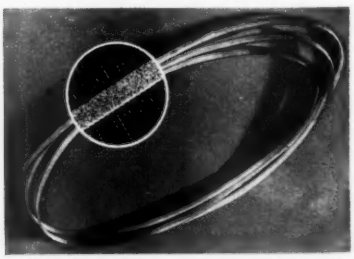
Circle Inform-A-Gram No. A38.

Stroke Counter. Developed especially for built-in applications on light production equipment is this small, reset stroke counter. (Photo is actual size). Literature on the counter is available from the Production Instrument Company, 714 W. Jackson Blvd., Chicago 6, Ill.

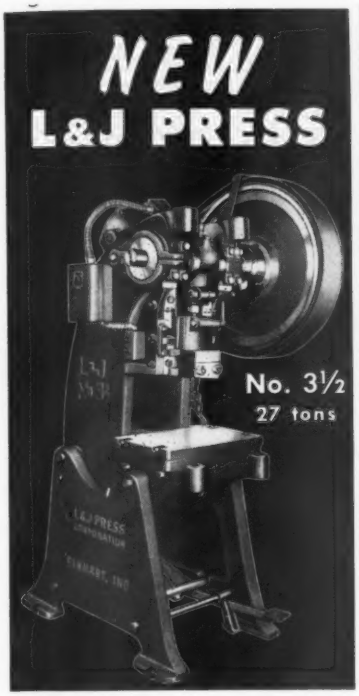


Circle Inform-A-Gram No. A39.

Diamond Belts for polishing carbide dies are now being made by the Hartford Special Machinery Co., Hartford 12, Conn. Made with du Pont nylon plastic, the belts are solving die polishing problems posed by the replacement of conventional steels by ultra-hard carbide in tube and rod drawing dies. The belts are made in rounds, half-rounds and irregular shapes. They are impervious to humidity and oil which allow the use of light oil as a coolant.



Circle Inform-A-Gram No. A40.



A new ruggedly built press with the capacity, rigidity and accuracy for a wide variety of precision work. It has the time-tested L&J features that give you more value for your money through better and more efficient press work.

SPECIFICATIONS

Strokes per minute	120
Ram stroke, standard	2½"
max. stroke (to order)	4"
Ram overhang, center of ram to frame	6¾"
Die space, standard*	8¼"
special,* up to	12¼"
Bolster plate area	21½"x 13"
Opening through back	10"

*bed to ram, stroke down, adjustment up

Let our local distributor show you the benefits of putting L&J Presses to work for you. 17 O.B.I. models—flywheel and backgear types—6 to 80 ton capacities. All available with L&J—Fawick Air Clutches for high-speed production.

Write for literature

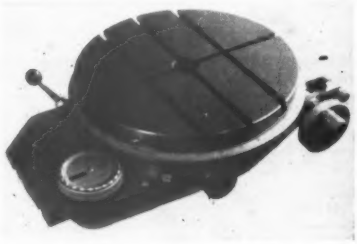
L&J PRESS CORPORATION
1626 STERLING AVENUE
ELKHART, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 153A

Vertical Tool Storage. An entirely new concept of tool location and protection for mechanics is built into the new Huot "Tuldex". Six 12" x 18" tool holding panels, made of

tempered perforated hardboard—along with two doors—give more than 24 sq. ft. of tool storage area. Further data available from The Huot Mfg. Co., 581 N. Wheeler St., St. Paul 4, Minn.
Circle Inform-A-Gram No. A41.

Rotary Table. The new 16" diameter Sagem optical jig borer rotary table is a heavy-duty, and fast dividing tool for high precision and low cost machining on jig borers and milling machines. It is ideal for



shop, toolroom and control. Because the measurement of angles is performed by a new optical system, its accuracy cannot wear out. Further data is available from the Technical Scientific Instrument Corp., Scarsdale, N. Y.
Circle Inform-A-Gram No. A42.

This New Driving Center eliminates driving dog and reportedly has been highly effective in reducing fabricating time on tracer and other

production lathes and cylindrical grinding machines. Further information can be had by addressing the Ze-Hawk Machine Specialties, 3716-20 W. Montrose Ave., Chicago 18, Ill.
Circle Inform-A-Gram No. A43.

SUPERBORE COUNTERBORES

and drills in 3 sizes to do the job right!

SUPERBORE products are made of supertough fine-grade high-speed steel. Fore and aft precision grinding of flutes and pilot allow chips to flow out freely. As in the case of REAMERS, flutes are backed off to width of land to prevent heat generation, clogging or freezing. All ⅜", 7/16" and ½" drills and counterbores have shanks of ½" diameter to fit that size drill chucks or collets.

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Sets Sold in Plastic Kits.

SUPEREAM

18 - 4 - 1 Steel
STUB REAMERS IN DECIMAL SIZES
FOR REAL SAVINGS

SUPEREAM STUB REAMERS

Straight Flute Right Hand Cut

Right-Hand Spiral Right Hand Cut

Left Hand Spiral Right Hand Cut

Right Hand Spiral Left Hand Cut

are suited exactly to your specifications in both standard and decimal sizes . . . .060 to .501 in stock. Other sizes ground in 3 to 4 days.

Chucking reamers . . . sizes .032 to .501 in stock

REAMERS or COUNTERBORES in SETS or single High-speed fluted chucking reamers with straight shanks also ROSE high speed.

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In Emergency Phone
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TWENTIETH CENTURY MANUFACTURING CO.
ROUTE 176 and BRADLEY ROAD
BOX 429TP LIBERTYVILLE, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 153B

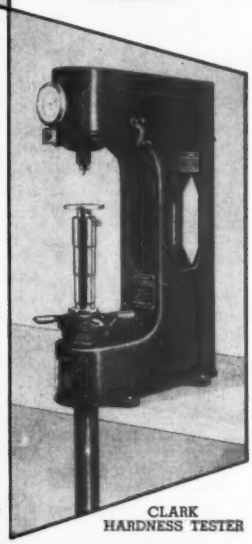
CLARK

THE MOST FOR YOUR "ROCKWELL TESTING" DOLLAR!

The Clark Hardness Tester is precision built to give guaranteed precision results. Thousands of Clarks, with years of service all over the world, attest to this.

The surprisingly low price includes the precision Clark Diamond Cone Penetrator, as well as Steel Ball Penetrators, a wide assortment of Anvils, Test Blocks, and other accessories. Available in two models, for Standard and Superficial "Rockwell" hardness testing, each with choice of 8", 12", or 16" work capacity.

Before you invest in any hardness tester, get the facts about the low price, speedy delivery, and *guaranteed accuracy* of the Clark. Write today.



CLARK HARDNESS TESTER

CLARK INSTRUMENT, INC. 10208 FORD ROAD DEARBORN, MICH., U.S.A.

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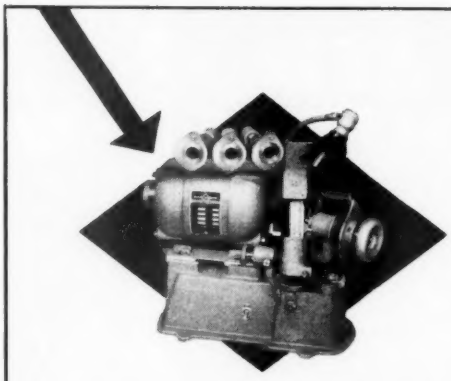

SHARPENS SMALL DRILLS *ACCURATELY* — WITHOUT SKILL!

The *Black Diamond Drill Grinder* is the only drill grinder so fast and easy to operate. Used regularly by thousands! Enables anyone to grind small drills to absolute accuracy.

- Exclusive "positive positioning" assures precision grinding.
- No skill required by operator.
- Both lips ground in one operation.
- Web thinning made easy with special attachment.

Get all the details! Send for folder.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
75 North Ave., Natick, Mass. OLympic 3-4480

CIRCLE INFORM-A-GRAM KEY NO. 154B

FRICTION SAWING WITH Tannewitz HIGH SPEED BAND SAWS

GREATEST COST SAVER IN METAL CUTTING

Tremendous savings of time and money are effected in trimming formed parts with Tannewitz High Speed Band Saws, for not only are the cuts made exceedingly fast, and smoothly, but in most cases no jigs or rests of any kind are required. Sheets of both hard and soft steel, and even such metals as 1" armorplate are handled with great advantage by this method, and it is ideal for trimming malleable and steel castings. By all means get the complete facts and learn of the many opportunities for boosting production and lowering costs that Friction Sawing with Tannewitz High Speed Band Saws offers. Write for circular.

for trimming castings of all metals write for bulletin on "Foundry Band Saws".

GL-6-1729

SAWING MACHINERY SPECIALISTS

The TANNEWITZ WORKS GRAND RAPIDS MICHIGAN

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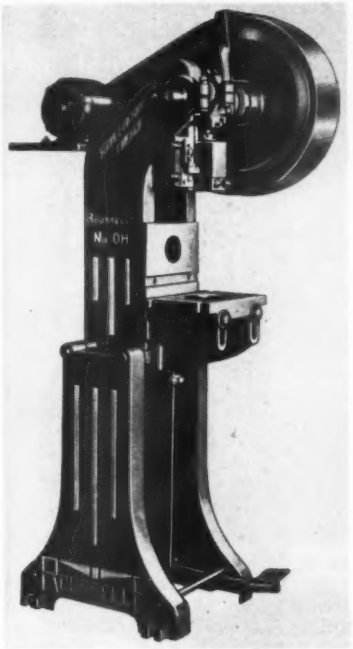
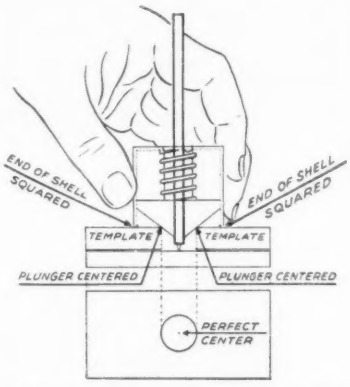


Five-Ton Horning Press. Greater usefulness, additional die space and extra adaptability are features of this new Rousselle Press. On either bench or floor models there is ample clearance beneath the bed or horn for handling large bulky work. For more detailed information write to the Service Machine Co., 7629 S. Ashland Ave., Chicago 20, Ill., or—
Circle Inform-A-Gram No. A44.

Accurate Centering with no layout or scribing is possible with a universal transfer punch. With this tool, a true center can be transferred in any hole from ⅛" to 15/16" diameter. Centering operation is easy!



Just set plunger in hole—it is self-centering; push shell down with fingertip pressure—it squares itself with the surface; slide punch down and tap with hammer. For further information, write to Universal Transfer Punch, Inc., Dept. TP, Box 412, Massillon, Ohio.
Circle Inform-A-Gram No. A45.

REID QUALITY TOOL-ROOM ACCESSORIES AT MODERATE PRICES!

CAST IRON HAND WHEELS
Solid Web and Counter Balanced

DISHED STRAIGHT COUNTER BALANCED

Made of fine grain cast iron. Center hole and faces of hub are true to rim. Rims and handles are ground and polished to high lustre. Top quality. Low prices. Many sizes. Immediate delivery. Alterations when required at nominal prices.

Wide Line of REID Accessories
These include clamping handles, C. I. hand knobs, machine handles, ball handles, compression springs, spherical washers and many other items at low prices.

FREE! NEW 52 pg. CATALOG

REID TOOL SUPPLY CO. Muskegon Heights, Mich.

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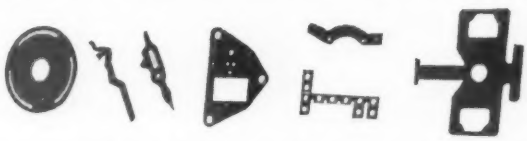
STAMPINGS---SHORT RUNS



A dependable service for small quantity requirements for new developments and production up to 50,000 pieces. QUICK DELIVERY — ACCURACY — backed by 23 years' experience.

Linden 3-4100 **SMALL LOT STAMPING CO.**
1025 W. Blancke St. "Dedicated to Short Runs" Linden, New Jersey

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RAPID SET-UPS with extreme accuracy—every time and on the first try!
Brookfield TOOL HOLDER

One Brookfield Tool Holder = One Conventional Tool Holder + Stock of at least 100 Bushings.

In Essence: A Floating, Precision Vise

- Adjustable V Jaw
- Axially True Design
- Balanced-Pressure Locking

No more fussing with bushings . . . just slip tool in jaw and tighten . . . run-out is less than .0001 per inch . . . Brookfield Tool Holders guarantee clean, easy, solid set-ups **every time and on the first try!** Models available for nearly all automatic and hand screw machines, turret lathes, radial drills, etc. Also useful as Adjustable Steady Rest and Work-Holder.
Write Dept. H. for descriptive brochure

BROOKFIELD, INC. 240 Cushing St. Stoughton, Mass.

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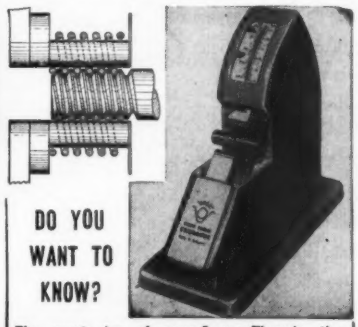

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The exact size of your Screw Threads, the actual discrepancy of Rejects, how much to allow for Plating, how to avoid Rejects? Limit or Ring Gauges cannot supply the answer, but the O-Vee Comparator with its **patented** screw thread measuring principle, will indicate the actual size of a screw without the need for costly set plugs. Used and approved by leading Government Depts., Aircraft & Automotive plants.
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O-VEE GAUGE COMPANY
2516 W. Vernon Ave. Los Angeles 8, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 155D

HARDENED and GROUND HSS BLANKS

Any decimal diameter to ¾"—in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.

Write or Phone ORange 3-4301 for price list D-3

WILLIAM T. HUTCHINSON COMPANY
235 Main St. Orange, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 156A

STOP DUSTS INSTANTLY

with

DUSTKOP

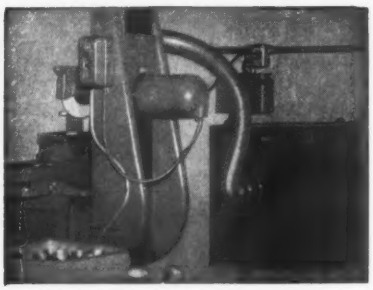
Available from stock of 22 standard models.

300 cfm to 10,000 cfm

Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—No Obligations.

AGET-DETROIT CO.

213 Main St., Ann Arbor, Michigan



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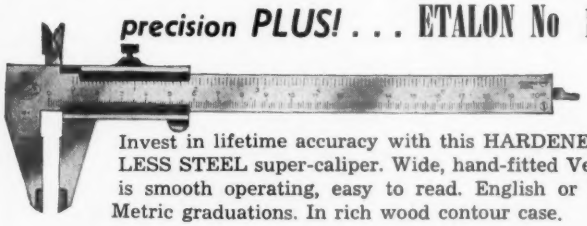
precision PLUS! . . . ETALON No 17



Invest in lifetime accuracy with this HARDENED STAINLESS STEEL super-caliper. Wide, hand-fitted Vernier slide is smooth operating, easy to read. English or English & Metric graduations. In rich wood contour case.

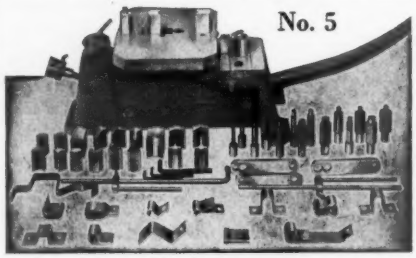
Ask your dealer, or write

$21.95
F.O.B., N.Y.

ALINA CORPORATION • 401 BROADWAY, NEW YORK 13, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 156C

No. 5



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BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛"x1½" as illustrated. Punching and round end blanking dies available. Other models up to ¼"x 4" air operated.

ALSO AIR OPERATED MODELS.

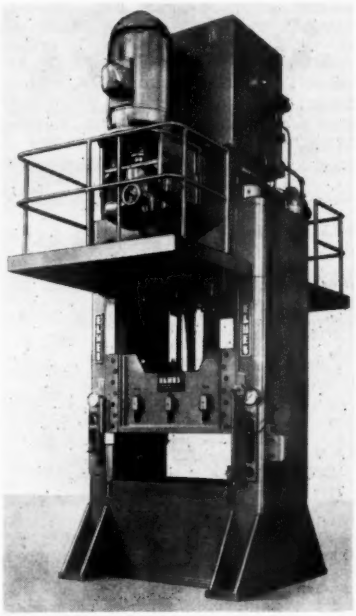
J. A. RICHARDS CO. KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 156D

A Precision Pantograph, designed for production engraving, profiling, die-cutting, and milling in steel, cast iron, non-ferrous materials, and plastics has been developed by John-

son & Bassett, Inc., 114 Foster St., Worcester, Mass. The 2-dimensional engraver can also do conventional milling. Complete details are available.
Circle Inform-A-Gram No. A46.

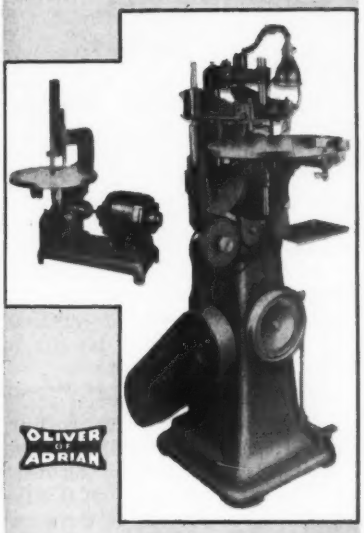
High Speed "Pipeless" Press. The new Elmes Hydraulic Press pictured here is a 450-ton single-action metal drawing and forming press with many special features including the Elmes revolutionary "pipeless" construction. The advantages of this



unique construction are low-cost maintenance, with downtime practically eliminated. Further details on this press are available from American Steel Foundries, Elmes Engineering Div., 1150-Y, Tennessee Ave., Cincinnati 29, Ohio.
Circle Inform-A-Gram No. A47.

OLIVER
DIE MAKING MACHINES
Are BEST for
Your Toolroom

Because . . . their efficiency, speed and accuracy in machine sawing, filing and lapping save time and cut costs up to 60%. Simple to operate, OLIVER DIE MAKERS further reduce costs because they do not require expensive, hard-to-get skilled labor.



For nearly 40 years OLIVER DIE MAKING MACHINES have proved invaluable on such jobs as production Filing, Experimental Work, Metal Patterns, Cams, Gages, Templates, etc.

OLIVERS have proved their worth in over 10,000 installations throughout the world. Many of these superior, long-lasting Die Makers have been in continuous use for more than 25 years.

OLIVER DIE MAKERS
Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write Today For Complete Technical Data on OLIVER DIE MAKERS

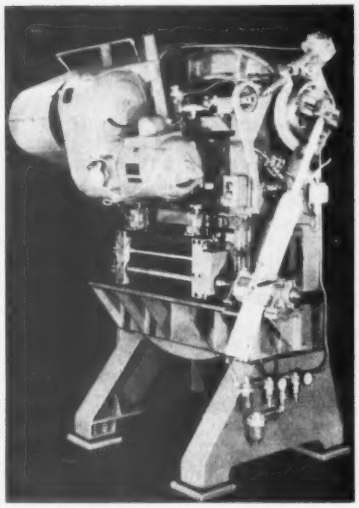
MACHINE TOOLS by OLIVER include:
AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

See our catalog in Sweet's Directory

OLIVER INSTRUMENT CO.
1436 E. MAUMEE · ADRIAN, MICHIGAN

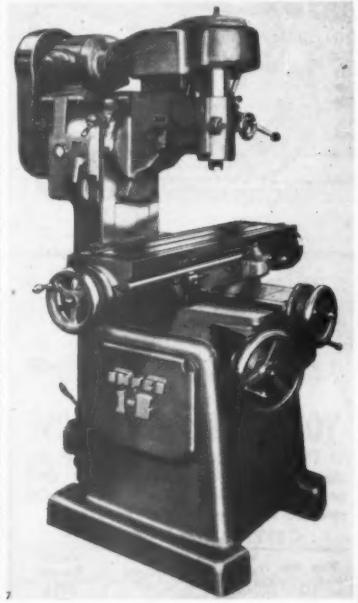
CIRCLE INFORM-A-GRAM KEY NO. 157A

New Diebel 40-Ton Automatic Press. You can stamp up to 23" wide stock on this new press with back to front feed. Use of air cylinders to clamp stock assures positive



feeding without distortion of soft metals. Length of the feed is infinitely variable from zero to 13". It is built by the Di Machine Corp., 2701 W. Irving Park Rd., Chicago 18, Ill. Further literature is available. **Circle Inform-A-Gram No. A48.**

A New Vertical Mill. Model 1-B, which is practical for both production and tool room milling is now available from the Industrial Metal Products Corp., 3419 W. Joseph St.,



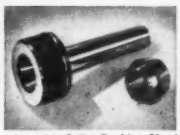
Lansing, Mich. A unique feature of this mill is its head which is vertically adjusted by a counter-balanced ram which gives greater accuracy and rigidity because of the greater scraped bearing surface area. **Circle Inform-A-Gram No. A49.**

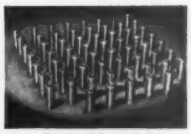
SOUTH BEND LATHE
ATTACHMENTS

- *Increase Lathe Versatility*
- *Simplify Difficult Jobs*
- *Perform Special Classes of Work*

Handlever Collet Attachment

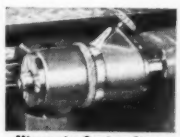
Telescopic Taper Attachment


Adjustable Collet Bushing Chuck


Steel and Brass Collets

Safety and Standard Lathe Dogs

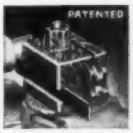
Telescoping Jaw Follower Rest and Center Rest


Micrometer Carriage Stop

Handwheel Collet Attachment

Milling Attachment

Ball Bearing Live Center



10 in 1 Tool Holder

Thread Dial Indicator

External Grinder

Centers, Drill Pads

Write for Catalog 5205
SOUTH BEND LATHE
Building Better Tools Since 1906
South Bend 22, Indiana

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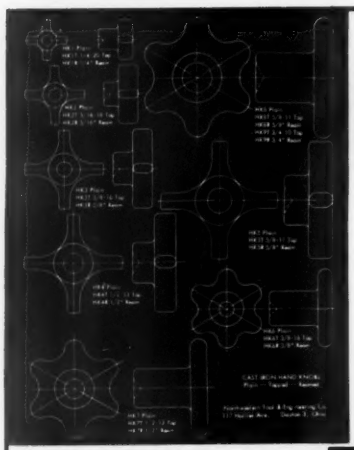

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TRACING TEMPLATE
COVERING 263 ITEMS
IN FULL SCALE

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BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
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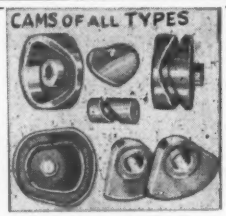
C A M S



MADE TO YOUR SPECS.

Dr. Charles Eisler, M. E. Pres.
EISLER ENGINEERING CO., INC.
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Take the GLARE out of Micrometer Reading with the "Lustro-Chrome" MICROMETER

MEASURE TO 1/10,000th

All graduations are well-defined black lines on dull chrome surface for easier and surer reading, even in poor light. Guaranteed accurate within one half of a ten thousandth of an inch.

Drop-forged model with chrome finished micrometer head, from $9.25 up. Ask for Micrometer Catalog

No. 901C 0-1" Size with LOCK NUT and RATCHET and 10th vernier as shown $13.25

This tool with TUNGSTEN CARBIDE tipped anvils $15.75

GEO. SCHERR CO., INC. 200 - 1 LAFAYETTE STREET • NEW YORK 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 158D

"Hand Controlled"
Di-Profiler
TRADEMARK

Used with any standard flexible shaft machine—speeds up to 15 M RPM.

The Di-Profiler is a new multiple action tool that (1) Reciprocates (2) Oscillates and (3) Rotates when used with the spindle attachment. Stroke is adjustable from 0" to ¼".

It files, hones, polishes, laps, chafes and saws materials ranging from carbide tools to soft materials. The only machine of its kind. **Write for full details and price list today.**

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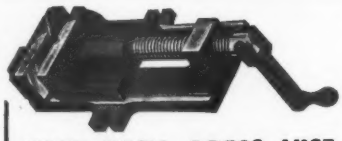


YOST DRILL PRESS VISE

● This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type?
Write today for bulletin on the extensive Yost line

YOST MFG. COMPANY
1000 MAIN STREET
Meadville • Pennsylvania

CIRCLE INFORM-A-GRAM KEY NO. 158F

WHAT'S RESEARCH?

SOMETHING OLD, NEW, BORROWED——OR?

Is Operations Research really something new or is it merely an old friend dressed up in new clothes.

At a panel discussion on the subject held recently at Illinois Institute of Technology, the experts disagreed.

Dr. Russell L. Ackoff of the Operations Research group at Case Institute of Technology said it is new. John K. Diederichs of the Booz, Allen, and Hamilton firm of consulting engineers said no, Operations Research is just a fancy name for management consulting or industrial engineering. Another panel member, Dr. T. E. Caywood of Caywood-Schiller Associates said "OR" is a science because its theories and methods can be codified and taught to others.

The difference between "OR" and management consulting, Ackoff explained, is this: When a firm buys consulting services, it buys experience; when it buys operations research, it buys experts who not only devise improved methods of operation but who train the company's personnel to effect these improvements.

"The usefulness of operations research depends upon its ability to obviate its future usefulness by making a company able, by itself, to perform 'OR' techniques," Ackoff said.

Diederichs disagreed. "Actually," he said, "there are a good many more firms that have 'OR' men but under different names; for example, vice president for planning, production analyst, controller, industrial engineer, etc."

Also participating on the panel were Paul H. Randolph, Operations Research analyst at Armour Research Foundation of Illinois Institute of Technology, and Edward C. Varnum, of Barber-Colman Company.

The Operations Research panel was part of a two-day Work Study conference held on the Illinois Tech campus. The conference was sponsored by the IIT industrial engineering department.

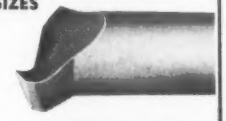
IS THIS OPERATION DONE IN YOUR PLANT ?

THEN USE THE 3 COMET "TIPS"

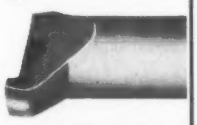
MADE OF HIGH SPEED or CARBIDE
FOR HOLES FROM 1/16" UPWARD
17 DIFFERENT SIZES

BORING TOOL
- FAST PERFORMANCE
- ECONOMY IN PRODUCTION
- EFFICIENT IN RESULTS

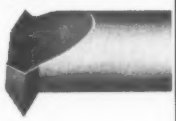
Cutting Edges are lapped for better "Bores" and Faster Feeds.



FACING TOOL
- CONSTANT CLEARANCE • EASY RESHARPENING
- CONSTANT SHAPE OF CROSS SECTION
- CONVENIENT TO USE • LONG LIFE



INTERNAL THREADING TOOL
- CONSTANT SHAPE AND CLEARANCE
- EASY RESHARPENING • LONG LIFE



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COMET Tool Co.

738-T BROADWAY, NEW YORK 3, NEW YORK

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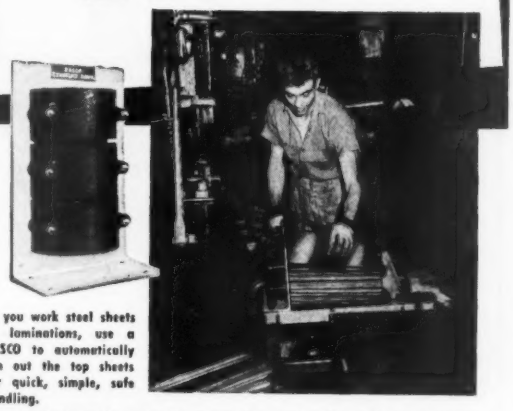
CUTLER HAMMER CO.

"Our BASCO Sheet Steel Separators have stepped-up production and cut-down injuries"



If you work steel sheets or laminations, use a BASCO to automatically fan out the top sheets for quick, simple, safe handling.

Five Standard Models to handle Round, Square, Nested or Odd Shape Sheets up to ¼" plate, Stacks 48" wide and 10½" high.

SOLD ON APPROVAL — try a BASCO for 10 days. If not satisfied return to us.

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E. V. NIELSEN, INC.
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Doubly Guaranteed

BRYANT (ROCK OF AGES) GRANITE SURFACE PLATES

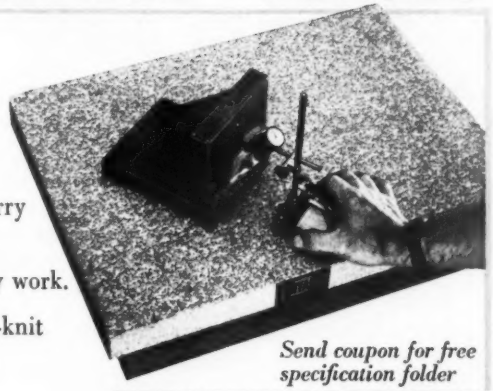
NOW, users of granite surface plates can get surface plates that are guaranteed both as to highest quality of stone and utmost precision of surface.

Bryant, maker of precision machine tools and gaging equipment, joins with the world-famous Rock of Ages quarry in producing these new granite surface plates which offer unsurpassed advantages in layout, inspection and assembly work.

Rock of Ages granite is unique in its exceptionally close-knit composition and flawless texture. The stone is finished on the head of the grain, a patented process.

Bryant Granite Surface Plates are economical because of their low initial cost . . . maintenance-free qualities . . . long-lasting accuracy.

Bryant *unconditionally guarantees* the flatness and accuracy of all Bryant Granite Surface Plates.



Send coupon for free specification folder

Bryant Chucking Grinder Co. TP
Springfield, Vt.

Gentlemen: Please send me your new free folder describing Bryant Granite Surface Plates

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COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

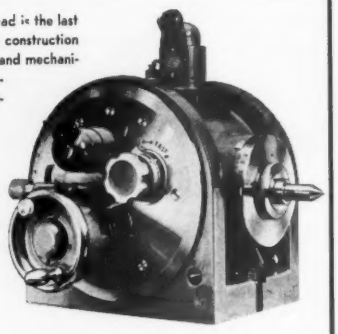
BRYANT CHUCKING GRINDER CO., Springfield, Vermont, U. S. A.

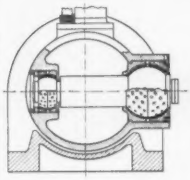
CIRCLE INFORM-A-GRAM KEY NO. 159C

A CUSTOMER SPEAKS:

"Without our Optical Dividing Head, we would not even attempt to make the critical indexing work nowadays necessary for things that fly, or mechanism that must control angular motions to hit targets at a distance, to measure degrees, minutes and seconds, to eliminate angular velocity errors and vibrations in quick running mechanisms, etc."

The LEITZ Optical Dividing Head is the last word in indexing precision. Its construction is different from other optical and mechanical dividing heads on the market.-A NEW DOUBLE SPHERICAL BALL BEARING, DOUBLE READING IN THE SAME EYEPIECE 1 0° APART, motor drive attachment and other features make the LEITZ an important aid required in any shop where precision is demanded.





The 2 spherical ends of the spindle are carried in hardened steel cups with several hundred small precision balls held in place by ball cages in such a way that each ball creates its own path. There is no play, either radially or axially, no oil film, no wear and a very large load capacity.

Write for Descriptive Bulletin

Geo. SCHERR OPTICAL TOOLS, Inc.

200 -T LAFAYETTE STREET • NEW YORK 12, N. Y.

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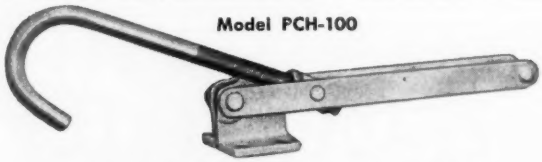
Model PCH-100



THIS NEW CLAMP

will simplify and speed your operations requiring pulling action.

This new clamp—a hook clamp—may have the answers to many of your problems—specifically where tension and sustained holding power is needed.

Save physical strength and time—simplify pulling jobs. Originally developed for aircraft industry, this unusual clamp can bring help to many other industries. Maybe yours!

Don't exert human strength; do the job mechanically. You can build up a great pulling force through the toggle action of this Knu-Vise clamp—quickly and easily.

We'll tell you more without obligation. Send for complete information.

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KNU-VISE PRODUCTS **LAPEER MFG. CO.**

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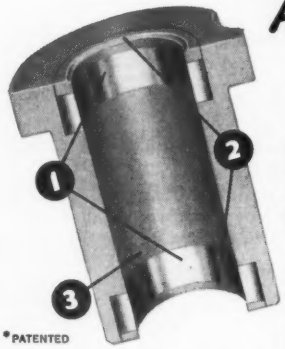
CIRCLE INFORM-A-GRAM KEY NO. 160C

MORE HOLES— MORE ACCURACY— FASTER— AT LESS COST



MEYCO

Carbide Inserted Bushings Are Doing It Daily!

*PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

For information and prices write for Meyco Bushing Catalog No. 17

HOW? Like this: (1) Last longer . . . with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

W. F. MEYERS CO., INC., BEDFORD, INDIANA

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NEED CARBIDE-TIPPED REAMERS *in a hurry?*

Staples can give —

48-HOUR DELIVERY on special reamers that are slight alterations of standard sizes

IMMEDIATE DELIVERY on standard sizes of expansion reamers—and solid reamers with straight and spiral flutes

Phone, wire or write for complete information!

Standardize on Staples Carbide-Tipped Circular Tools—you'll get longer tool life, greater accuracy, and spend less time on tool servicing. Staples is the *quality* name in carbide tool production. If you require special tools, Staples welcomes the opportunity to help you get the utmost in precision hole production. Tell us your requirements.

THE STAPLES TOOL COMPANY • Cincinnati 25, Ohio

Staples CARBIDE-TIPPED CUTTING TOOLS

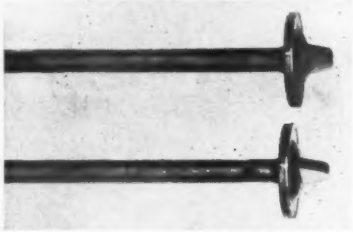
A complete line of Circular Carbide-Tipped Tools, Expansion Reamers—Special Tools

CIRCLE INFORM-A-GRAM KEY NO. 160D

FORGINGS SIZED BY STRADDLE BROACHING

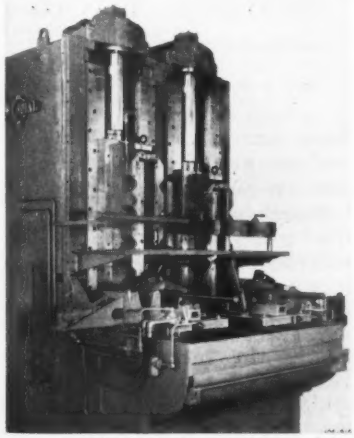
One of the big problems in machining steel forgings is the amount of stock left for finish, which increases as the dies wear.

This problem has been avoided in the operation for straddle broaching a tang on the end of an SAE 8653 truck axle, shaft steel forging, by specifying a

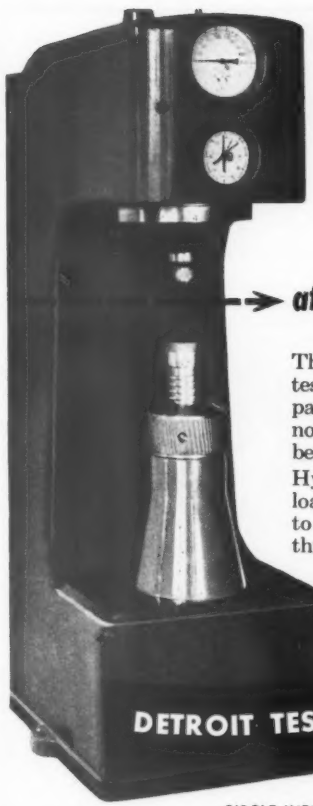


dual rough and finish broaching setup. This method allows considerable size variation in the forging but leaves a uniform amount of stock for the finish broaching operation. The machine on which these operations are performed is a 26-ton 66-in. stroke dual ram broaching machine.

The shafts are located radially in the fixtures by retractable fingers that move out of place when the table shuttles into broaching position after the parts have been hydraulically clamped. The parts are loaded into the fixture manually. After a pass of the broach, a finished broached part is removed from the right hand fixture, a rough broached part lifted from the left hand fixture is then loaded in the right hand fixture and a rough forging is loaded in the left hand fixture. Thus a finished part is produced with each pass of the broach.



Photos courtesy Colonial Broach Co.



Brinell Testing

at production line speeds!

This direct reading Brinell hardness tester tests round or flat parts *fast*. No grinding of parts is necessary and the operator simply notes that the dial indicator needle falls between pre-set tolerance hands.

Hydraulically applied standard Brinell test loads are used. Foot control allows operator to test parts as quickly as he can move them through the machine.

Write for more information on all our Brinell testing machines.

DETROIT TESTING MACHINE COMPANY

9386 Grinnell Ave., Detroit 13, Mich.

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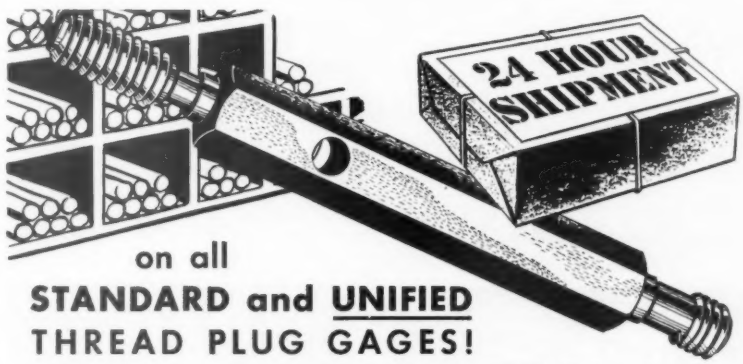

on all
STANDARD and UNIFIED
THREAD PLUG GAGES!

Yes, Perfex is one of the few who stock "Unified" thread plug gages. We offer shipment within 24 hours on all standard threads to 1½" NC and NF, class 2 and 3; stock "Unifieds" are UNF and UNC 2B and 3B, all subject to prior sale. Of course, you get the well-known Perfex quality in any standard gage or specials from the smallest up to giant 22" gun breech thread gages. Our equipment and skills, best in the business, make it possible for us to give you fast service and precision work.

If you're not familiar with Perfex Precision Products, wire or phone. Our representative in your area will contact you and quote on any gage requirements.

Makers of all standard and special gages and "Tangi-Magic", the angle-tangent-to-radius wheel dresser that saves hours.

ACCURACY PERFEX OUR CREED

PERFEX GAGE & TOOL CO.

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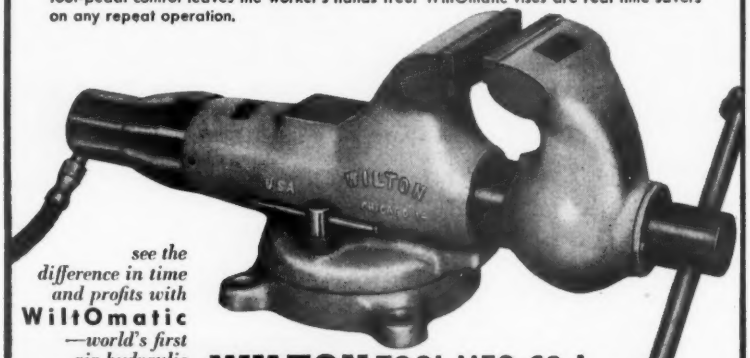
CIRCLE INFORM-A-GRAM KEY NO. 161B

LOOK AT THIS
WiltOmatic
TIME $AVING!
USING VISE X, CLAMPING TIME ½ MINUTE
USING WiltOmatic, CLAMPING TIME 3 SECONDS
WiltOmatic power vises operate both manually—like ordinary vises—and automatically, from compressed air lines or gas cylinders. On automatic, clamping is a split-second operation. Hydraulic booster cylinders provide a powerful, vibration-free grip, and foot-pedal control leaves the worker's hands free. WiltOmatic vises are real time savers on any repeat operation.

see the difference in time and profits with WiltOmatic —world's first air-hydraulic power vise and manually powered bench vise
WILTON TOOL MFG.CO. Inc.
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tear out this ad and send it to us for your free copy of the Wilton catalog. TP-6
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ULTRA-CHEX GAGE BLOCKS for Every Need!
Supplied in one Superior Accuracy
5 MILLIONTHS ± ACCURACY
34 BLOCK SET (shown)...$125 INCL. OPT. PARALLEL
82 BLOCK SET.....$275 IN CASE
These sets will supply the needs of any discriminating shop that must work to gage-block precision. IMMEDIATE DELIVERY

WRITE FOR ILLUSTRATED FOLDER
9 Block Set
For Individual Mechanic
$22.50
OPTICAL PARALLEL
$5.00 Extra
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DON'T SCRAPE DON'T SCRAP worn surface plates them either . . .
Step-them-down and continue using them for less accurate work.
You'll save enough money to replace with Rahn Diabase for your most accurate work.
It's being done. Many companies have adopted this NO COST way of converting from metal to Rahn Diabase (black granite) Surface Plates.
PROVE IT YOURSELF... FREE 30 DAY TRIAL
WRITE FOR BOOKLET ON DETAILS.
THE COMPLETE LINE
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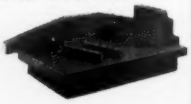
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LAY-OUT AND IDENTIFICATION DYE

7 COLORS
For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.
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A Carbide Tool For Rough Boring Stainless Steel

Outstanding production results on rough boring applications of stainless steel tubing with standard clamped tungsten carbide insert boring heads are being experienced by a Pacific Coast manufacturer of stainless steel castings.

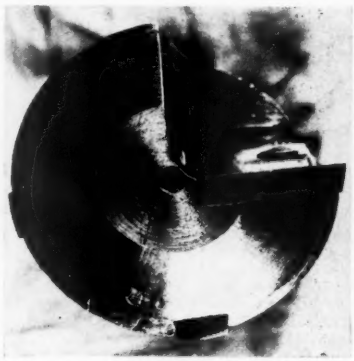

Photo courtesy of Kennametal, Inc.

End view of boring head utilizing standard "H" type Grade K2S insert. Wear pads on the O. D. guide boring head during cut to assure a true bore.

Tubing, 74" in length, ranging in outside diameter from 3 to 13 1/8" and inside diameters from 1 3/4 to 11 7/8", is now easily being bored in one cut on medium-duty standard engine lathes.

Standard H-type Grade K2S tungsten carbide inserts are secured in the boring head with heavy steel spring clamps and buttonhead clamp screws.

New Furnace Building Plant

Construction of a new C. I. Hayes Inc. plant was begun March 1 at Cranston, Rhode Island, near the location where the Hayes firm has been making industrial electric heat treating furnaces since 1905.

Completion is expected shortly after mid-year, and will see the activities of the company integrated in a single building designed for the purpose. In some 60,000 feet of floor space will be located the activities now dispersed among six buildings, including the Research Laboratory, constructed in 1947.

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● A Boring Head that Won't Face is Not Complete

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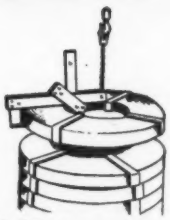
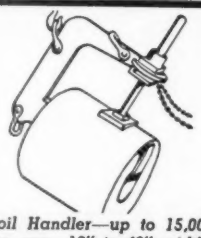


Coil Lift—up to 2,000 lbs. cap., 1" to 24" widths



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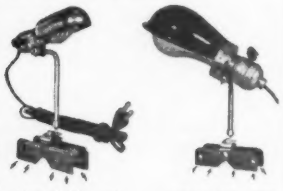

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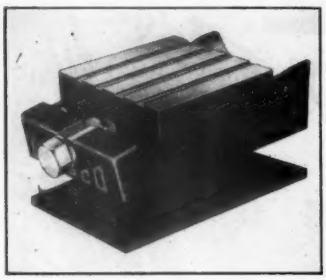
IMPROVED MACHINE LEVELING JACK
is 50% stronger, yet lower in height.



Engineering improvements have made this Jack 50%, stronger yet lower in height. This was accomplished by redesigning the Empco Jack so that the adjusting screw always remains cradled in the assembly. This insures full bearing of either front or back collar at any stage of operation.

Once the machine is set on Empco Jacks, the simple turning of adjusting screw, with a hand wrench will lower or raise the machine until your level indicator reads "zero". With this feature, periodic machine leveling can be done in a matter of minutes.

To reduce vibration, Vi-Sorb Mounting Pads are available with each style Empco Jack. These pads substantially reduce vibration, the percentage of reduction usually depends upon the thickness of the pad that is used.

Level machine installations with periodical re-leveling is essential to lower costs of machine maintenance. These costs are further reduced by the use of Vi-Sorb Mounting pads under every Empco Leveling Jack.

Available in three styles: JC-1 (standard) and JC-2 (heavy duty) pictured here, and the newest style JS particularly designed for use with anchor bolts. Many models in all styles with minimum height ranging from 1⅞" to 4".

For complete specifications and prices write the **Enterprise Machine Parts Corporation,** 2735 Jerome Ave., Detroit 12, Michigan.

CIRCLE INFORM-A-GRAM KEY NO. 164B

NEW ADJUSTABLE DRILL JIG
eliminates layout; cuts drilling time

Used for drilling holes through round stock and hex stock from ¼" to 2" and cap screws from ¼" to 1¼", the new Mathewson Adjustable Drill Jig eliminates layout and can cut drilling time on small lots to a fraction. And it eliminates the costs of special jigs for larger quantities. Holes for cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws, are all typical of the operation that can be done more economically with this jig. Hole diameters range from .052" to .531", using your A.S.A. standard slip bushings. The hardened V-block has two 60-degree V's for centering round or hexagonal stock, one for ¼" to 21/32" diameter, one for 21/32" to 2" diameter. Adjustable stop for locating work longitudinally for drilling any distance from end, may be used on either side. Adjustable bushing carriers hold slip bushings and clamp work securely. Jig highly successful in permitting use of inexperienced drill operators. For circular write to: **Mathewson Machine Works,** 38 Hancock St., Quincy, Mass.

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3. No re-setting — Work can be adjusted to any position of tool.
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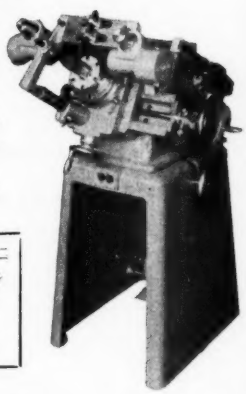

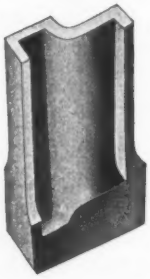

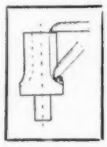

5. Minimum hand work.
6. Convenient, simple operation. Uses standard shaping tools.

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CIRCLE INFORM-A-GRAM KEY NO. 164D

MACHINE TOOL TECHNOLOGY TO BE REVIEWED AT MIT SESSION

A special summer program to review developments in Machine Tool Technology will be given at the Massachusetts Institute of Technology from June 15 through June 25.

Professor Ernest H. Huntress, director of M. I. T.'s Summer Session, says this year's program will emphasize topics associated with all phases of the use of machine tools. It will be conducted in the new Metals Processing Laboratory, dedicated in June, 1952, the gift of the Alfred P. Sloan Foundation, Inc.

The program will be under the direction of Dr. Milton C. Shaw, Professor of Mechanical Engineering, who is in charge of the Machine Tool and Metal Cutting Division in the M. I. T. Mechanical Engineering Department. He will be assisted in presenting the program by other members of this division and by a number of visiting guest lecturers.

The following topics will be presented from a fundamental point of view, according to Professor Shaw: machine tool requirements, evaluation of machine tools, vibrations and their isolation, machine tool controls, alignment, lubrication of machine tools, gaging and measuring techniques, and principles of statistics and quality control.

Modern laboratory equipment for carrying out machine tool research will be demonstrated, and there will be round table discussions of problems of special interest to the members of the group. Other topics scheduled include a comparison of European and American machine tool philosophies.

In announcing plans for this special summer program in Machine Tool Technology, Professor Huntress also calls attention to a similar two-week program in Numerical Control of Machine Tools, which will be presented from August 23 to September 3 in the M. I. T. Servomechanisms Laboratory. Get further information and application blanks for either program from the Summer Session Office, Room 7-103, M. I. T., Cambridge 39.

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De-Sta-Co Toggle Clamps are extremely flexible in their application and are economically and easily adapted to work-holding fixtures for assembly, welding, bonding, machining or other production processes. Smooth, fast, powerful clamping action clamps parts quickly . . . holds them firmly in perfect alignment . . . releases instantly for easy removal and insertion of new workpiece.

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Write today for name of nearest distributor and your copy of the De-Sta-Co catalog which describes over 40 fixture and portable models with positive holding pressures up to 4000 pounds.

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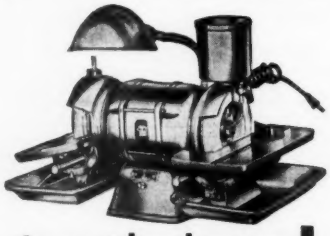

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Plants: New York, Chicago, Detroit, Montreal

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USE SPLIT DIES FOR PRODUCING TAPERED SECTIONS

Latest advancements in the fast-developing processes of extruding metals is the use of split dies to produce intricate, longitudinally tapered sections, such as I-beams. The so-called split-die techniques is a radical departure from conventional extrusion methods because it utilizes dies that can be moved laterally during the extruding. Ordinarily, the dies are stationary in the extrusion press.

The split-die method and other extrusion techniques are described by three engineers of Loewy Construction Company, in an article recently published by The American Society of Mechanical Engineers.

The co-authors, H. Albers, G. Krause and A. Greensite, point out that extrusion presses are now being used to produce longitudinally tapered, "step" and multishouldered extrusions, as well as combination die forgings and extrusions.

Improved press design, increased capacity and the introduction of automatic die changing have helped to make the extrusion of complex shapes possible. To produce "step" extrusions, for example, a method has been devised to change the split dies automatically with a minimum of cycle interruptions. The system has been incorporated on a new 20,000-ton extrusion press.

This system, the Loewy engineers say, shows great promise in the field of aluminum extrusion. Since the required billet temperature for aluminum is low, as compared with steel, for example, and since its plasticity is retained for long periods by container heating, the prospects in this direction are most favorable.

Get the information YOU want conveniently and quickly — use a TOOLING and PRODUCTION INFORM-A-GRAM CARD — page 133.

. . . Jig Grinding, from page 59

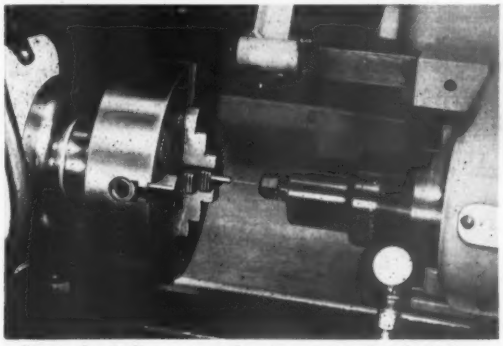
and the bushings cannot be used. In such cases the holes can be jig ground direct in the hardened plate in spite of very close spacing.

A wider use of the jig grinder is inevitable. Users soon find that it is as indispensable as the jig borer itself, once the operator becomes conversant with the new technique. The advantage rapidly becomes known in the tool room and the design division, and new applications with better work in shorter time results. Tool rooms accepting outside contract work will soon find jig grinding designed into the tools which they are asked to build just as jig boring is now.

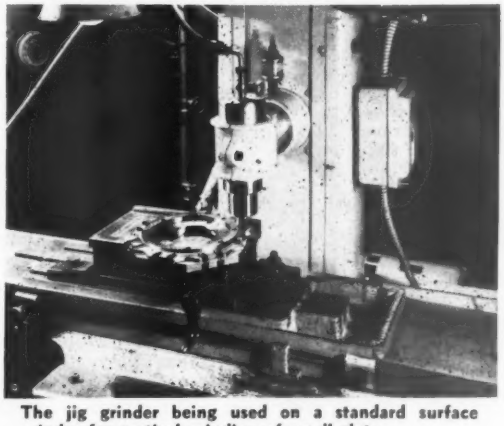
At present two methods of jig grinding are available. One takes the form of a complete machine basically the same as the jig borer but with the spindle replaced by a unit carrying the grinder head.

The second method, shown in the accompanying illustrations, consists of the jig grinding head which fits into the existing jig borer's spindle thus converting this machine tool into a jig grinder when needed. (Similarly, it can be fitted to other machine tools).

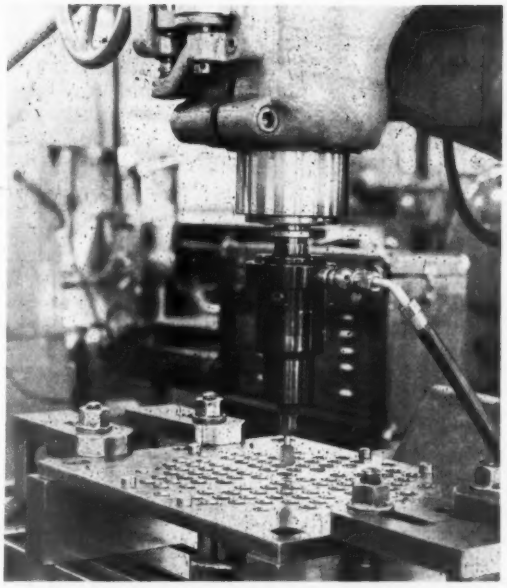
The jig grinder head can be put on and taken from the machine in a few seconds. The machine therefore is not tied up permanently as a jig grinder and is still an economical investment for those who only expect to use it occasionally.



Internal grinding, using the air motor only adapted to a regular internal grinder motor head.



The jig grinder being used on a standard surface grinder for vertical grinding of small slots.



Close spacing of holes in this drill jig plate prevents use of bushings. Drill plate is rough bored, hardened, and then jig ground.

With the development of a second grinding head for holes 1½″ to 4″ in diameter, a complete range from the smallest to quite sizeable holes can be jig ground. Thus a workpiece calling for various sized holes from 1/16″ to 4″ can be accommodated. The larger holes will of course be ground with the slower 20,000 rpm grinder and the smaller holes with the 65,000 rpm high speed head.

The jig grinder can be used successfully by the average jig borer operator after very little experience. There is no necessity to train an operator to run a completely new machine.

The unit is very compact and places a minimum strain on the machine spindle. Actually, it places far less strain on the machine spindle than the normal boring or drilling operations usually carried out on jig borers.

There are a few who object to using a jig grinder on a jig borer since there is a possibility of damage to the machine due to dust. By using our dust collecting system however this objection is overcome, and it must be remembered that far less harm is caused to a machine when jig grinding and using a dust extractor, than when jig boring cast iron, for instance, without one.

CRANKSHAFT DRILL POINT GRINDER IS FAST AND ACCURATE

A new crankshaft drill point grinder provides a fast, accurate method of grinding crankshaft points on drills ranging in size from #1 through #50, A through U, and 3/64" through 3/8".

In operation, the drill is rocked into the wheel to grind one notch, returned, indexed 180°, and the operation repeated for the other notch. An adjustable diamond truing device trues the wheel with one quick motion. There's a tilting fixture adjustable for any sharpening angle, and flute guiding drill bushings can be furnished for each diameter of drill as needed.

The motorized spindle is precision ground with preloaded ball bearings and mounts a six inch grinding wheel at one end and a six inch general utility wheel at the other. Motor is 1/4 h.p., 110 V., 60 cycles, 3450 R.P.M., fully enclosed and bench space required is 19 x 12 inches.

In describing the advantages of a crankshaft drill point, it has been pointed out that crankshaft pointing consists of cutting away, or notching, the drill point in such a way that the usual chisel edge becomes a pair of secondary cutting lips, leaving virtually no web thickness at the center. This improves the cutting action; the center of the drill, instead of smearing or extruding the material under the chisel edge, removes two clean-cut secondary chips. This is especially valuable on materials which tend to work harden.

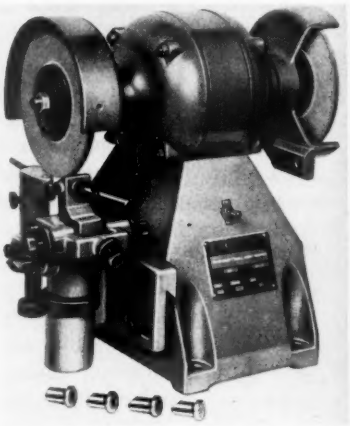
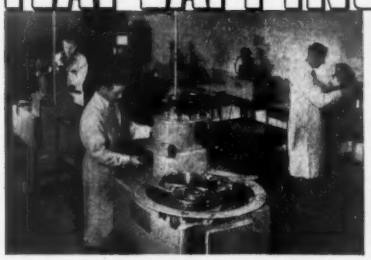


Photo courtesy of Union Twist Drill Co.

The crankshaft point is well suited for deep hole drilling and for drilling stainless and tough alloy materials. It is also commonly used in the aircraft industry for skin drilling, aluminum, stainless steel and heat treated parts.

FLAT LAPPING OF METALS



A view of our experimental lapping laboratory. In 1953 we proved to over 200 manufacturers that lapping was profitable and solved their problems.

Our lapping laboratory is also equipped with the finest checking instruments to insure an accurate report of every experimental job.

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Precision Flatness, Finish and Parallelity in Production Quantities

and how to get it

Over 500 manufacturers of industrial equipment including pumps, compressors, valves and controls plus many of the largest automotive and aircraft plants have found production lapping a great time and money saver in their operations. In many cases gaskets between mating surfaces have been eliminated, while in others a closer tolerance has brought about a tremendous improvement in product performance. The extreme high production accuracy of the Lapmaster (Micro-inch finishes of 2 to 3 RMS—surface flatness to less than .000011" when required) have amazed and sold many production men. This accuracy has been definitely proven on practically all materials including cast iron, steel, stainless steel, aluminum, brass, carbon, ceramics, plastics and sintered metals.

Our Lapping Laboratory Is At Your Service

There is one sure way to find out if lapping is practical and profitable for you with no strings attached. We invite you to send us a few sample parts including surface finish specifications and approximate production requirements. The parts will be lapped in our laboratory shown above and returned to you with complete facts including data on number of finished parts per hour and recommended Lapmaster size to do the work. Many companies, large and small, have already taken advantage of this free service. In a majority of cases the Lapmaster has proven its use. Why not find our for *yourself* today.

Crane Packing Co., Dept. TP-6 Cuyler Ave., Chicago 13, Ill.
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Additional Data
on the Lapmaster is available on request, also new information on Measuring Flatness. Write for your copies today.

JOHN CRANE CRANE PACKING COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 168

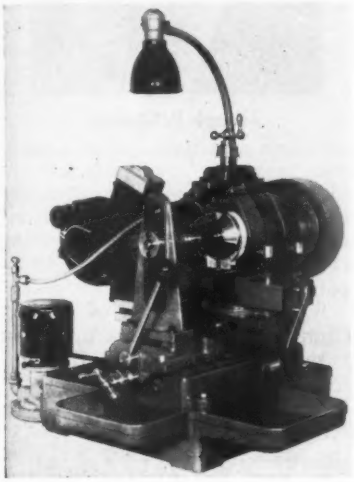
HERBERT HARIG NAMED NTDMA SECRETARY

Herbert Harig, vice president of the Harig Mfg. Corporation of Chicago, has been elected secretary of the National Tool & Die Manufacturers Association. He succeeds the late Albert Goldman of Philadelphia.

The association represents 800 of the nation's leading contract tool, die and special machine shops. Mr. Harig formerly served three consecutive terms as treasurer of NTDMA.

Barker Mill Is More Versatile

A new completely equipped Barker mill capable of an increased range of milling and machining operations is now on the market. The unit has a low spindle speed drive developed especially for milling steel; an arbor support which makes possible heavy milling cuts without chatter; a coolant pan with motor



driven pump, cutter guard and spindle nose coolant shield and a standard swivel base vise.

The model illustrated also is equipped with micrometer feed screws on the head and saddle travel positions. It is, possible, however, to have hand lever operation or micrometer feed screw operation to control travel on all three positions. Different combinations of these feed controls can be selected to best suit the user's requirements.

Complete details can be obtained by writing the Barker Engineering Company, 502 Green Road, Cleveland 21, Ohio, or—**Circle Inform-A-Gram No. D1.**

Honorary Member

Senator William A. Purtell (R-Conn.) has been made an honorary member of the American Society of Tool Engineers. A former director of the U. S. Chamber of Commerce and past president of the Manufacturers Association of Connecticut, the senator is a founder of the Holo-Krome Corporation.

Heads Aircraft Parts Manufacturers

Merle Davis of the Mendelson McCarthy Company was elected president of the newly organized Aircraft Parts Manufacturers Association of California.

Proposed plans of the West Coast organization call for finding solutions for financing the expanding of industry; dissemination of interesting news and vital data; monthly open forums to interchange information; a plan to notify and keep purchasing agents advised of pertinent facts on members; and a program on seeking solutions for converting extra facilities to non-military work. Headquarters will be at 951 N. La Cienega Blvd., Los Angeles 46, Calif.

Now—Lock Your Feed Rates to Protect Machines . . . Reduce Costs with the CROSS Flow Control Lock!

Only authorized personnel carry a key for the Cross Flow Control Lock! They set machine feed rate, then lock it.

Easy to install. Just remove valve nameplate and adjusting lever, reinstall over lock mounting plate.

Available for Vickers ¼" flow control valves and remote control panels.

For full details, write Dept. A-76

- Eliminates Tampering
- Stops Costly Shutdowns
- Prevents Tool Abuse and Breakage
- Protects Machines Against Overloads
- Reduces Maintenance Costs

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 169

Joseph P. Crosby Is Named New ASTE President

Joseph P. Crosby, vice president of the LaPonte Machine Tool Company, Hudson, Mass., is the new president of the American Society of Tool Engineers. He was elected to succeed Roger F. Waindle, Muskegon, Michigan, consulting engineer, as head of the 115-chapter, 30,000-member Society for the coming year.

A registered professional engineer in Massachusetts, Mr. Crosby is also a director of LaPonte, manufacturers of broaching machines, tools and fixtures.

Elected along with Mr. Crosby were Dr. H. B. Osborn, Jr. of Cleveland, Ohio, as first vice president; H. C. McMillen of Bedford, Indiana, as second vice president; and H. E. Collins of Houston, Texas, as third vice president.

Dr. Osborn is technical director, TOCCO Division, Ohio Crankshaft Company. Mr.

Joseph P. Crosby

McMillen is plant manager for Philco Corporation. Mr. Collins is manager, Process Engineering Department, Hughes Tool Company, Houston, Texas.

R. C. W. Peterson of Toledo, Ohio, was elected treasurer. He is president and owner of Peterson Engineering Company. Wayne Ewing was elected secretary. Mr. Ewing is a partner of the Arrowsmith Tool and Die Company, Los Angeles, California. Harold D. Long of Chicago was elected assistant secretary-treasurer. Mr. Long is president of Scully-Jones and Company, Chicago, Illinois.

Directors are Named

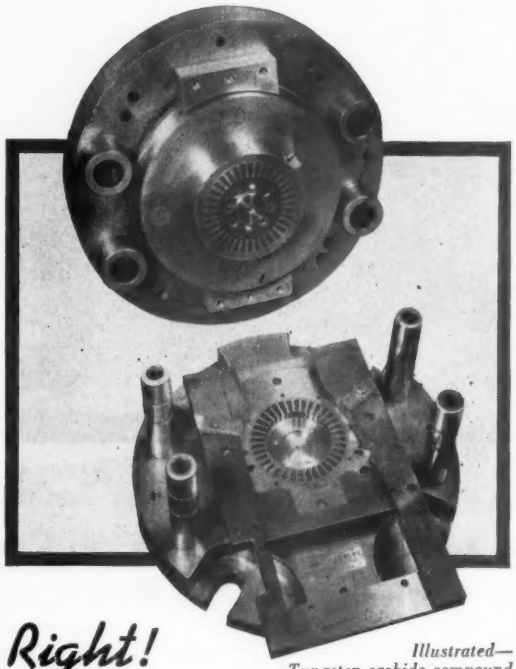
New directors elected include A. B. Clark, technical consultant, Haynes-Stellite Company, Cleveland; C. M. Smillie, president, C. M. Smillie & Company, Detroit; J. O. Horne of the J. O. Horne & Company, Rochester, New York; Mr. Long and Mr. Ewing.

Re-elected to the Board of Directors were Willis Ehrhardt, managing partner, Ehrhardt Tool and Machine Company, St. Louis, Missouri; J. A. Goodwin, chief process engineer, Master Electric Company, Dayton, Ohio; B. J. Hazewinkel, president, Daily Grinding, Inc., Los Angeles, California.

G. A. Rogers, sales engineer, Rudel Machinery Co., Ltd., Montreal, Canada; R. A. Smith, chief tool engineer, Pratt & Whitney Division, Niles-Bement-Pond Company, West Hartford, Conn.

Mr. Crosby, Mr. Collins, Mr. McMillen, and Mr. Osborn were also re-elected to the Board.

We Design *Dies* that do the Job *Right!*



Illustrated— Tungsten carbide compound die for stator laminations.

Tungsten Carbide or Steel Applications

DIES
Lamination
Piercing and Blanking
Compound Perforating

FORM TOOLS
Circular Dovetail
Flat

GAGES, JIGS and FIXTURES
To suit your most exacting requirements

Will you "give us a crack at" your very next tough job? We are in position to design a die from a piece part or from drawings which will exactly fill your needs. More than that, it will deliver you maximum *production* with the extreme *accuracy* you must have. Your assurance is to be found in our modern, efficient plant, thorough engineering, careful craftsmanship, and a long acquaintance with die requirements. You must always get — and we will give you — *production with accuracy.*

May we quote on your requirements?

CLEVELAND FORM TOOL & DIE COMPANY
1643 Eddy Road Cleveland 12, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 170

GROWING PAINS

"Industrialists are taking to the wide open spaces as never before because assorted taxes (municipal sales, income, realty, etc.), plus inadequate expansion space in crowded cities are forcing them to put up the new plants they need on suburban and country sites."

The above was stated by Grant A. Sattem, vice president and general sales manager of Luria Engineering Company at a recent three-day sales convention of building dealers and contractors.

◆

Robertshaw-Fulton Controls Company is expanding its production facilities with the opening of a new plant at Indiana, Pa., some 50 miles northeast of Pittsburgh. The new $475,000 plant is for the manufacture of certain new products now being readied for the market.

◆

The new chemical Products Plant of **Aluminum Company of America** in Bauxite, Arkansas is 50 per cent complete, with two of the four production units in operation. The newly-operating plant will produce specially-calcined alumina.

◆

The Hartford Special Machinery Company announces the opening of its new ultra-modern 44,000 sq. ft. plant in Simsbury, Conn. This is the first step in the company's plans to ultimately move entirely from Hartford to Simsbury.

◆

Westinghouse Electric Corp., recently broke ground at Blairsville, Pa., for its new multi-million dollar metals plant some 45 miles east of Pittsburgh. The new plant will bridge the gap between research and the commercial application of new metals in the electrical industry.

Acquisition of space which will double the facilities of the manufacturing, engineering and executive departments of **Conforming Matrix Corp.,** has been announced by H. E. MacArthur, president. Included in the Toledo, Ohio expansion program is a completely new machine manufacturing department which was made necessary by the greatly increased demand for automatic equipment and mask washers.

Completion of the first phase of the **General Electric Company's** plastic expansion program has been announced by J. L. McMurphy, Plastics Department General Manager. Approximately 5,000 sq. ft. of office space and toolmaking facilities have been added to G. E.'s Taunton, Mass., plastics plant. Also, the addition of 17,000 sq. ft. of mfg. space at the Plastics Dept's Decatur, Ill., plant will be completed shortly.

IT'S NEW! IT'S DIFFERENT! IT'S BETTER!

Eliminates Diamond Wheel Grinding

1. Tools can be micro finished on every cutting surface including the top which prevents hollowing or rounding of any cutting edge.
2. Table—designed and built so that all edges, including hooked tool edges, may be finished. Table extensions combined with quick, angular table settings read directly on a protractor, make finishing all edges a simple operation.
3. Immediate and positive finishing belt adjustment.
4. Positive V-Belt control through Jack-Screw adjustment automatically provides correct drive belt tension at all times.
5. Belt and pulley guard rigidly attached to machine.
6. Sealed ball bearing construction, dynamically balanced pulleys, rigid cast machine base.

WRITE FOR FULL INFORMATION

LEMPCO **LEMPCO PRODUCTS, Inc.**
Industrial Division
BEDFORD, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 171

. . . Press Working, from page 47

The successful production of deep drawn shells is also based on the proper sequence of operations from cup to final draw; the suggested reductions for both cylindrical and rectangular drawn shells, as given by Reynolds Metals Company, is stated in Table III. The deep drawing of cylinders usually presents no problem.

In instances where a difficult draw is performed on an alloy with limited ductility, it is suggested that circled stock, obtained directly from the mill, be considered. Thus, not only will the objectionable work hardening occurring when blanking from strip be avoided, but also, a more uniform softness of blank can be obtained. The purchased blanks are annealed prior to shipment; the uniformity of the anneal being superior when compared to an annealing operation performed on coil material. In the latter case, the thickness of the coil will be a deterrent for a uniform anneal throughout the entire coil.

A drawing sequence on 3S-0 aluminum is indicated in Figure 1; the formulae as given in Table III for the drawing of cylindrical shapes being applied. Trim and beading follow the four-draw sequence. The illustration, Figure 2, indicates the depth of draw occurring in the "cupping" operation; the part illustrated being the smaller of two washing machine tubs used in "Easy" washers. A 29 inch blank, which is properly lubricated, is drawn into a shell that is 15 inches in diameter and 11 inches in depth; the drawing being done on a 250 ton hydraulic press. On the basis of diameters, this cupping operation gives an approximate 50 percent reduction from blank diameter to cup.

The die installation, illustrated in Figure 3, utilizes an 1800-ton double acting mechanical press which is fitted with three die sets for the drawing of aluminum tubs. The die in the center reduces the blank to a cup that is 27 inches in diameter and 11 inches in depth; this piece being the larger size of aluminum washing machine tub. The redraw operation is indicated on the right and is 22 inches in diameter and 18½ inches in depth. The set-up on the left is the redraw operation of the tub as illustrated in Figure 2; the redrawn shell being 11 inches in diameter and 18 inches in depth. A unique feature of this installation is that all three operations are performed simultaneously.

Table II Suggested Clearance Values (Reynolds Metals Company)

Cylindrical Shells	Die Size = Punch Size +
First Draw	2.2 times the blank thickness.
Second Draw	2.3 times the blank thickness.
Third and Subsequent Draws	2.4 times the blank thickness.
Sizing Operations	2.0 times the blank thickness.
Rectangular and Square Shells	
First Draw	2.2 times the blank thickness.
Second Draw	2.2 times the blank thickness.
Subsequent Draws	2.2 times the blank thickness.
Final Draw	2.0 times the blank thickness.

Both blank development and tooling are critical in the forming of rectangular and square containers. In blank development, it should be remembered that sufficient metal must be provided at the corners so that sufficient hold down pressure is obtained during the drawing operation. Of equal importance is the use of locating pins within the press setup so as to establish a true center for the blank in relation to the tooling employed. Generous spherical radii at the corners of the punch will aid in increasing the possible depth of draw.

In the development of a sequence of operations involving two or more drawing operations, successful forming will dictate some deviation of shape so that gradual working of the corners to the required radii can be realized without failure or excessive wrinkling. Thus, a square shape requiring a three-draw sequence will usually have a "cup" or first draw which may be cylindrical in shape; the first redraw will approximate a square shape with bulged sides; and, a second redraw operation will result in the final shape.

. . . *Continued on page 182*

Fig.. 3. Huge 1800-ton double-action press utilizes three stations which form simultaneously. Left, redraw of tub illustrated in Fig. 2; center, cupping of a larger size tub; and right, redraw of the large size tub.

Courtesy Reynolds Metals Co.

American Standard Perforators

For Improved Production Schedules - Reduced Die & Maintenance Costs.

Precision Ground For High Production. In All Sizes .040 to .875

Use Them In The Dies You Make, Specify Them In The Dies You Buy.

Available From Stock For Immediate Delivery.

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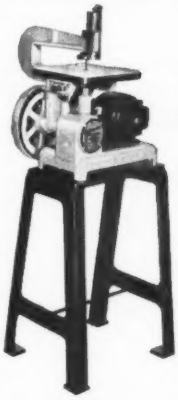
AMERICAN STANDARD PERFORATORS

4878 W. GRAND AVE., CHICAGO 39, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 173A

CUT TOOL AND DIE-MAKING COSTS WITH . . . Milwaukee DIE FILERS PROFILE GRINDERS



DIE FILERS

. . . for straight-line sharp corner filing, sawing and lapping

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

Write for illustrated Bulletins and Prices

PROFILE GRINDERS

. . . for high speed Precision Grinding of curved and Irregular Contours

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

RICE PUMP & MACHINE COMPANY

228 PARK AVENUE BELGIUM, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO 173B

SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS

IMMEDIATE DELIVERY FROM STOCK

3AT, 3C 1A, 4C 5C

480 (AC-50)

All collets in hexagon, square and round.

KLUTCH-KOLLET

Step collet for accurate chucking to 2¾" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

FOR ATLAS • LOGAN • SOUTH BEND CRAFTSMAN • SHELDON LATHES, ETC.

LEVER-TYPE DRAWBAR ½" cap.

Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.

HAND DRAWBAR ½" cap.

Let us quote on your quantity orders for any type of collet, live center or other machine tool attachment!

LIVE CENTER (Ball Bearing) Double sealed for accuracy.

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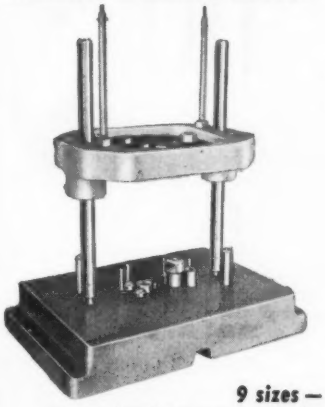
KASSON DIE AND MOTOR CORP. 32-14 Northern Boulevard LONG ISLAND CITY 1, N. Y. | Integrity Since 1919

CIRCLE INFORM-A-GRAM KEY NO. 173C

Zagar Self-clamping DRILL JIGS

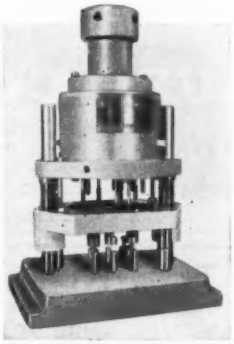
NOW STANDARDIZED for DRILLING, REAMING, TAPPING



9 sizes — 5 combinations per size — for hole patterns 3" through 15" dia.

Standardization makes for quick delivery and attractive price. Only a few minor parts need be made. Speed up machining operations. The operator merely feeds the parts — the Zagar Self-clamping Drill Jig does the rest. Zagar drill jigs are now "off the shelf".

◆ ◆ ◆



Zagar drill jigs can be used in conjunction with Zagar gearless multiple-spindle drill heads to ream, drill, and tap on standard drill presses and tapping machines. Or, Zagar can quickly supply the complete "package" unit.

◆ ◆ ◆

Write for New Bulletin "T-6"

ZAGAR TOOL, INC.

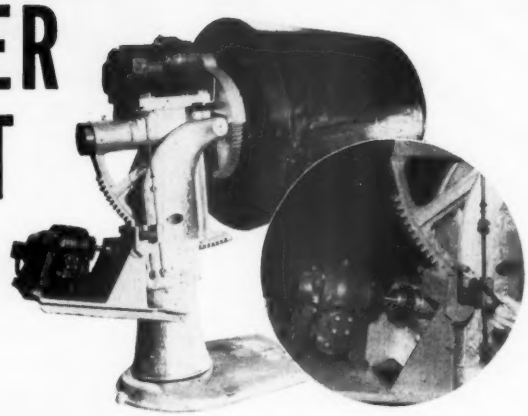
24000 LAKELAND BLVD., CLEVELAND 23, O.

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

CIRCLE INFORM-A-GRAM KEY NO. 173D

HUPP GIVES YOU

POWER TILT



for

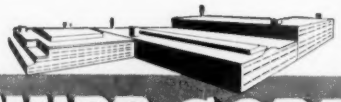
safety • economy • convenience

Fingertip tilting brings you the advantages of faster tumbling cycles, reduced operator fatigue and savings of floor space in your finishing department. Globe's new tilting mechanism enables your operator to quickly move the barrel to pre-selected or manually selected operating position by means of a simple, 3-position reversing control.

Write for Tumbling Barrel Bulletin B-9

WHAT'S YOUR FINISHING PROBLEM?

Let HUPP's experimental engineering service analyze your parts finish needs. Send samples of parts and completed piece to show desired finish. HUPP will provide detailed cost-saving finishing recommendations. Write today! No obligation, of course.



HUPP CORPORATION

GLOBE STAMPING DIVISION

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SERVING INDUSTRY SINCE 1912

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THE KOCH TEST INDICATOR

IS THE ONLY TOOL MAKERS INDICATOR ON THE MARKET WITH TWO WORKING ENDS, FOR PRECISION WORK, ONE END TO TEST OUTSIDE SURFACES, THE OTHER INSIDE.

WHAT EVERY TOOL ROOM TOOL MAKER OR MACHINIST NEEDS.

Plunger moves away from, instead of against the lever, protecting delicate parts from sudden or excessive jolts. Each graduation on scale represents 1/1000" movement of plunger $10.00 plus postage.

Positive-Lock SURFACE GAGE

Drawbolt has positive lock to prevent slippage. Spindle: 9"x5/16". Block: 3¼"x2½"x1" with 90° angle groove in base. Surface Gage is precision ground. $8.75 plus postage.

Ask your dealer for these tools and buy through him. If he cannot furnish them, Write to us.

ANDREW GENALES, NYACK, N.Y.

A-28 Second Ave. Tel. Nyack 7-2222

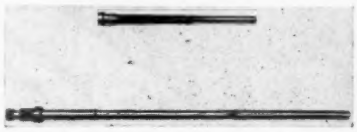
Dealers Wanted

CIRCLE INFORM-A-GRAM KEY NO. 174B

. . . **Flame-Plating, from page 95**

cess is being used on core rod and sizing punch operations in the production of bearings. It has increased the production of steel rod from 15,000 to 100,000 parts.

In the first operation a core rod is used to form bearings from powdered metal. In the second



The flame-plated coating of tungsten carbide on the working end of these steel parts is .002-in. thick. The hard, wear-resistant plating is capable of a certain amount of flexure along with base metal, and therefore is resistant to chipping and breaking.

operation a sizing punch is used to assure that inner and outer dimensions of the bearings meet specifications. In this work a single steel punch "sized" 10,000 bearings. Since it has been flame-plated, production for one sizing punch has jumped to 270,000 units — a ratio of 27 to 1.

The deposit made by the flame-plating process is a hard, wear resistant coating of tungsten carbide that can be applied in thicknesses ranging from .002-inch to .010 inch. Low temperature deposition is a major advantage of this new process. The base metal does not exceed 400 deg. F. while being coated. This eliminates the chance of a change in physical properties of the base metal, and reduces the possibility of distortion.

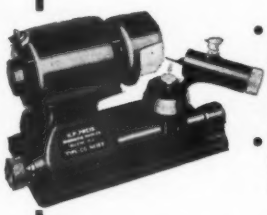
Tests show that the flame-plated coating has a lower modulus of elasticity than solid sintered tungsten carbide — 27 million sq. in. as compared to 90 million. This is desirable because a low modulus material can stand considerably more mechanical and thermal shock than a material with a high modulus of elasticity.

ABRASIVE HANDBOOK

Materials for lapping, super-finishing and polishing are listed in an abrasive compound handbook offered by Abrasive Engineers, 245 Waukegan Ave., Highwood, Ill. This manual should be of particular interest to tool shops, gage makers, plastic and die mold makers and mechanical and hand lapping departments.

Circle Inform-A-Gram No. D2.

PREIS-PANTO CUTTER GRINDER



- Precision grinds single lip engraving and routing cutters.
- Highest precision—lowest price.

A sturdy and accurate grinder that produces absolute concentricity, perfect angles and proper clearance on cutters. Also supplied for 2, 3, 4 lip cutters, straight or tapered shanks.

PANTO* Ask for literature upon our full line of Engraving Machines and Accessories.
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647 U. S. Route 22 Hillside, N. J.

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METAL PRODUCTION CAPACITY AVAILABLE

For long or short production runs of large or small parts, tools, jigs or fixtures. Also dies, gages, special machinery.

Keller Profilometer-Duplicator, 16"x24".

Presses up to 450-Ton, 48" x 48", triple action.

Planers up to 20-foot stroke, 72" x 72".

Radial Drill Presses up to 8-foot, 19" column.

Lathes up to 158" c.c, 57½" gap, 40" swing.

Boring Mills up to 120" bed, 90" horiz., 60" vert.

Also Milling Machines, Grinders, etc. Complete production facilities — experienced machinists.

Inquiries Invited on Contract Basis Or Individual Quotation

PIVOT PUNCH & DIE CORP.

NORTH TONAWANDA, N. Y.

Phone JA. 1200

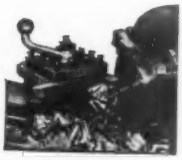
CIRCLE INFORM-A-GRAM KEY NO. 175C

Enco TURRET TOOL POSTS SAVE VALUABLE SETUP TIME

The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.

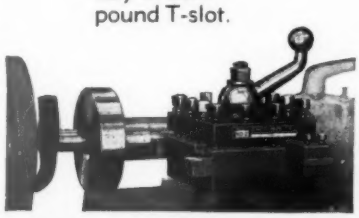
¾" square tool bit mounted in Model 4½-S turret used for facing cut.

- √Accurate within .0005.
- √Keeps setting accurately.
- √12 position indexing.
- √Indexing is self-contained—eliminates all chip-interference.
- √Hardened steel construction.
- √Mounts rigidly in compound T-slot.



The same tool used for broadface turning merely by indexing turret one position or 30°.

Manufacturers of the most complete line of HEXTURRET BED TURRETS, TURRET TOOL POSTS and TAILSTOCK TURRETS in the country. Send for Catalog No53.



Same tool used for inside chamfer merely by indexing back two positions or 60°.

ENCO Manufacturing Co., Dept. 764
4524 W. FULLERTON AVE., CHICAGO 39, ILL.
Reasonable Deliveries

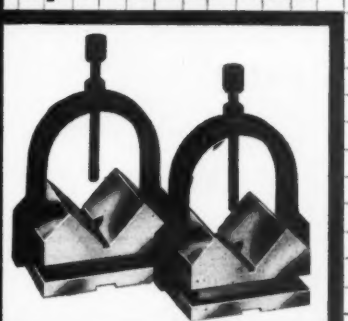
CIRCLE INFORM-A-GRAM KEY NO. 175B

THE PERFECT MATE FOR ALL FINE INSTRUMENTS OF STANDARDS

UNI-V-BLOCK by Precision Tool

Made of close grain, stabilized Chrome-Moly alloy to guarantee precision results every time. The exclusive new FROZONE process, for hardness and stability, makes *UNI-V-BLOCKS the closest thing to absolute perfection, on the market today!*

Shown here is MODEL No. 3000 (2½ x 3¾ x 2⅛")
UNI-V-BLOCKS are also available as:
MODEL 5000 (4⅛ x 5⅛ x 5⅜")
MODEL 1250 (1¼ x 1¼ x 1⅜")



ACCURATE TO WITHIN .0002" T. I. R.

FREE! WRITE NOW FOR MORE INFORMATION!

PRECISION TOOL & MFG. CO. OF ILLINOIS
1305 S. Laramie Avenue
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PRECISION TOOL & MFG. CO. OF ILLINOIS
1305 S. Laramie Ave., CICERO 50, Illinois P-6
Gentlemen: Please send me complete data on the new UNI-V-BLOCKS, at no obligation to me.

NAME
COMPANY
ADDRESS
CITY ZONE STATE

CIRCLE INFORM-A-GRAM KEY NO. 175D

. . . Safety Hazards, from page 68

off is designed for the die, this hazard is eliminated. The pick-off is nothing more than a hook attached to the top half of the die. The hook pulls the completed part off of the die as the ram rises to the top of the press stroke.

SAFETY GUARD DESIGN

The majority of punch presses in use at the Brown-Lipe-Chapin Division are small, short stroke, mechanical clutch type presses. Accident reports have shown that this type of press causes the majority of accidents involving amputations. Much work has been done, consequently, on developing guards to fit various dies and presses.

The main purpose of a cage type guard is to completely enclose the die, leaving an opening sufficient for entry of parts to be processed. Complete success is attained when the opening can be smaller than that necessary for a person's finger.

The three general types of cage guards are known as side guards, front guards, and complete, or tailor-made guards.

The side guard is attached to a punch press and becomes a part of the press. The side guard consists of a left-hand and a right-hand unit, and each unit is made adjustable in order to attach it by means of a hook to the front grille guard.

The frame of the side guard is made of 1/8" x 1" cold rolled steel. The grille bars, or rods, are 1/4" dia. cold rolled steel and are spot welded to the frame. The rods are spaced 1 1/4" apart.

The overall sizes of these guards vary with the size press on which they are being used. They must be long enough to cover the opening between the back of the press and the front of the bolster plate, and they must be wide enough to cover the side completely when the press ram is at its top position.

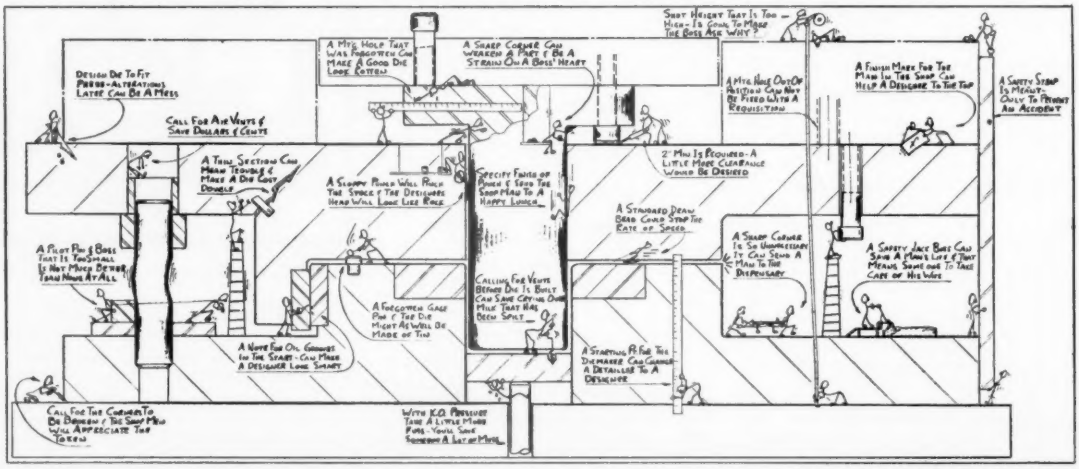
The front grille guards are made of the same material as the side guards. They differ in design in that they have an opening for entry of the parts to be processed. In general, the front grille guard must be made to suit the press as well as the die. For that reason, the front grille guard measurements are taken when the die is set up in the proper punch press ready for production. The guard is bolted to the front of the die.

The most important safety consideration in the application of the front grille guard is that the opening be no larger than absolutely necessary for entry of the part, and that the opening be placed in the best location for easy and safe operation.

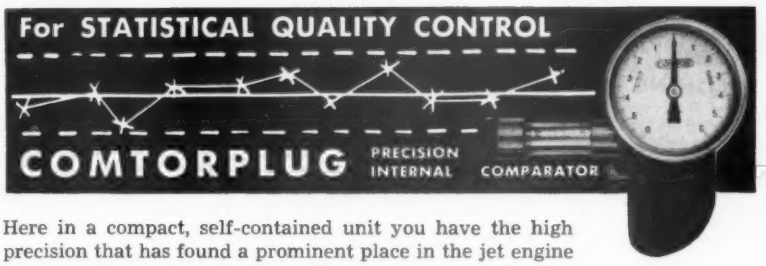
CONCLUSION

Eliminating safety hazards in press operations is accomplished not by safety gadgets and guards alone. These are important tools, but with them there must be a study of the press loading and unloading operations, and there must be an effective safety organization among all of the employees. An approach from these three points offers the opportunity for the highest degree of safety for workers in press plants. An engineering analysis of the method of doing work may suggest a better way, and very often the better way is the safer way. In addition to providing safer operations, some of the safety improvements enable a department to show higher production rates and lower costs than formerly.

HELPFUL HINTS FOR DESIGN OF DOUBLE-ACTION FORMING DIE


Design Die To Fit Press—Alterations Later Can Be A Mess
A Mtg. Hole That Was Forgotten Can Make A Good Die Look Cotton
A Sharp Corner Can Weaken A Part & Be A Strain On A Boss' Heart
Shut Height That Is Too Much—Is Going To Make The Boss Age Why?
A Mtg. Hole Out Of Position Can Not Be Fixed Unto A Requisition
A Finish Mark For The Man In The Shop Can Help A Designer To The Top
A Safety Strap Is Meant Only To Prevent An Accident
Call For Air Vents & Save Dollars & Cents
A Thin Section Can Mean Trouble & Make A Die Cost Dowels
A Sloppy Punch Will Rock The Stock & The Designers Head Will Look Like Rock
Specify Finish Of Punch & Send The Soap Man To A Happy Lunch
2" Min Is Required-A Little More Clearance Would Be Desired
A Standard Draw Bead Could Stop The Rate Of Speed
A Pilot Pin & Boss That Is Too Small Is Not Much Better Than None At All
A Sharp Corner Is So Unnecessary It Can Send A Man To The Dispensary
A Safety Jack Base Can Save A Man's Life & That Means Sure One To Take Care Of His Wife
Calling For Vents Before Die Is Built Can Save Crying Over Mud That Has Been Spilt
A Forgotten Gage Pin & The Die Might As Well Be Made Of Tin
A Nose For Oil Grooves In The Start-Can Make A Designer Look Smart
A Starting Punch For The Diemaker Can Change A Detailer To A Designer
Call For The Customer To Be Present & The Shop Man Will Appreciate The Token
With K.O. Pressure Take A Little More Punch-Youll Save Yourself A Lot Of Mud

—Drawn by Stanley Noreika
HEINTZ MFG. CO., Philadelphia, Penna.



Here in a compact, self-contained unit you have the high precision that has found a prominent place in the jet engine program, the automatic transmission program and other fast moving set-ups. Used at machine or bench, Comtorplug has self-aligning features assuring accuracy. Ideal for Statistical Quality Control programs. Comtor Co., 82 Farwell St., Waltham 54, Mass.

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With Interchangeable Expansion Plugs from ⅛" to 8" dia.

For gaging high-precision holes to fractions of .0001"

NEEDS NO WIRES, HOSE, ELECTRONIC GEAR OR HEAVY BASE

"Packaged Precision"

CIRCLE INFORM-A-GRAM KEY NO. 177A

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Precision 16" 5/8 "Capacity Drilling Machine

in Bench or Floor Model

saves time in tool-room and model shop by reducing set-up time and supplying correct speeds.

WIDE RANGE INSTANT SPEED SELECTION OF 150 TO 4000 R. P. M.

for drilling, reaming, spot-facing, counter-boring and tapping. Variable speed spindle with built-in back gears, driven by ½ HP single or three phase built-in motor. Completely enclosed drill head design; *no belt changing required.*

FEATURES . . . Convenient direct reading infinitely variable spindle speed control dial, together with a drill size, speed and material chart; Quick-set vernier depth control; Sealed-for-life ball bearings thruout; Heavy construction plus precision machining for accurate and dependable performance; Counter-balanced head on bench model; Tilting table and ground base on floor model.

Model 602, 600 to 4000 RPM, $290. FOB Milwaukee, Wisc., complete with motor, work light and cord.

Bench Model 601 variable speed counter-balanced head. Supplied with No. 2 Morse taper or Jacobs No. 2A taper.

Free Data on this advanced design precision drilling machine is available upon request.

THE ELECTRO-MECHANO CO.
260 E. ERIE STREET MILWAUKEE 2, WISCONSIN

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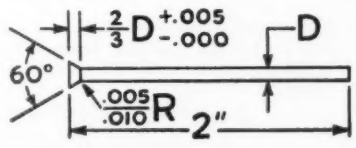
Can you make your own at *TWICE* the price?

±.0003" centerless ground
PERFORATING PUNCHES

Save time, money, detail work. Use standard precision Perforating Punches—tough, durable, 57 Rc hard, with square, sharp cutting ends—for a few cents apiece. Heads are annealed with plus tolerance for finishing. 2" long in sizes up to .125"; all others 2½". In stock for immediate delivery: Diameters .024" to .110" inclusive in .001" steps; also .125", .128", .130", .141", .156" and .1875". Write for full details.



ROSS TOOL COMPANY
1517 Lyell Avenue, Rochester 6, New York

CIRCLE INFORM-A-GRAM KEY NO. 177C

FIXED ABRASIVE LAPPING & POLISHING STONE

Laps and polishes most metals in minutes. No skill required. Produces a 2 micro-inch finish on hardened steel. Outdates all other hand-lapping procedures. Grit throughout stone, no compound required. No metal or material will load stone; even stock removed from aluminum and carbon is easily wiped away with an oil wetted cloth. Reconditioning, when required, is easily done in your shop.

10" x 12" x 2" — only $29.50
12" x 14" x 2" — only $39.50
12" Diam. x 2" — only $29.50
16" Diam. x 2" — only $52.50

THERMO-SET PLASTIC BOND CUTTING & POLISHING WHEEL

A uniform, tough, resilient and safe wheel that will give exceptional wear at speeds up to 75,000 RPM. Will not load, but is heat resistant, cool cutting and reduces chatter. Use for deburring, cutting and polishing. Specify ¼" or 5/16" hole. Counterbored to accept arbor head. Approx. 5/8" thick. Stocked: 120 - 280 - 500 - 800 - 1600 grit.

Diam.	¾"	1"	1¼"	1½"
1 - 11	$ .75	$ .90	$1.05	$1.15
12 - 71	.65	. 75	.90	1.05
72 or more	.50	.65	.75	.90

Arbor for ¼" Collet — $ .60

BORON-CARBIDE COMPOUND

A diamond abrasive substitute for a fraction of diamond cost. WILL NOT CHARGE hard or soft metals. Stays with the work. Heat resistant synthetic base. BORON-CARBIDE COMPOUND is economical — it cuts lapping time by more than 50%.

QUAN.	PRICE GRIT SIZE 80-100 -120-150 180-220-240	GRIT SIZE 280 -320-400 500-600	GRIT SIZE 800
1 oz.	$ 1.25	$ 1.50	$ 1.75
¼ lb.	4.45	5.50	6.75
½ lb.	6.80	8.40	10.65
1 lb.	10.15	13.45	18.95

(Prices subject to change without notice)

We are specialists in SUPER FINISHING MACHINE LAPPING COMPOUNDS AND LAPPING OIL. We also manufacture DIE MOLD POLISHING CLOTH, SCRATCH-FREE CUTTING HONING STONES, and ABRADING STONES that are made to take a contour readily. Handbook and prices upon request.

The following companies highly recommend our fine products which have been developed through chemistry as added tools for industry's growing demand for finer finishes.

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Top quality Gage and Machine Mfr.

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Gentlemen: ☐ Please send Handbook.
Please ship at once:
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NAME
ADDRESS
CITY ZONE STATE

CIRCLE INFORM-A-GRAM KEY NO. 178A

. . . Drawing Compound, from page 57

with the result that a hand wiping operation had to be resorted to in order to prepare the surfaces for satisfactory plating.

This incident is sighted to emphasize the importance of the finisher having complete knowledge of the type of drawing compound used. Thus he is enabled to select the proper cleaning method which will give him a complete surface cleaning job and thereby produce acceptably finished parts.

So until the perfect fool-proof, all purpose drawing compound comes along which will allow for variations in draws, metals, presses, cleaners, finishes, and the human element—you can have a more peaceful and profitable life by considering the answers to the questions on the following check list in selecting the right lubricant for the job.

Check List

1. Kind of metal to be drawn.
   - Size of sheet before drawing
   - Gauge of metal
2. Type of draws.
   - Number of steps
3. Make of press.
   - Hydraulic
   - Punch
4. Cleaning operation to be used.
5. Finish on completed piece.
   - Bonderized
   - Porcelain Enamel
   - Baked Enamel
   - Paint
   - Lacquer
   - Varnish
   - Other
6. Special Information.
   - Are pieces spot welded before cleaning?
   - Are pieces stored before finishing using Drawing Lubricant as a rust preventive?
   - How long stored?
   - Where stored?

NOT THIS . . . But This

When Your Punch Press Operators Use **SAFEED** Patented

PREVENTS INJURY—Saves Glove Costs. Feeds ferrous, non-ferrous strip or sheet . . . faster, safer! Use for stamping. Right or left hand non-slip fitted grip, self-adjusting. Sturdy hardened work surfaces. FULLY GUARANTEED

Write Today! **Affiliated Machine & Tool Company**
Early Delivery **260 West St., New York 13, N. Y. CAnal 6-493**

CIRCLE INFORM-A-GRAM KEY NO. 178B

For those who construct

OPTICAL COMPARATOR

Charts and projector scale layouts

. . . A NEW MATERIAL . . .

Gage Company

• Precision Plastic •

PROVIDES

Dimensional stability (impervious to moisture).
Fine matte surface (arrests shadows sharply).
Ideal for drawing (use pencil, ink or scribe).
Thickness to suit (.030 and .100 stocked).
Moderate cost (price list furnished with sample).

SEND FOR

Free Sample

We shall send you an 8" x 10" trial sheet of .030 Gage Company Precision Plastic complete with instruction sheet on simple techniques for use, data sheet providing full specifications for this remarkable, stable material and a price list of stock sizes and thicknesses.

GAGE COMPANY

ORIGINATORS AND MAKERS OF
PRECISION PLASTIC COMPARATOR CHARTS

BATTLE CREEK, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 179A

"IMMEDIATE" DELIVERY!

SPECIAL SIZES TAPS & DIES

Size	Threads Per Inch	Size	Threads Per Inch
2	40-44-48-64-72-80	9/16	14-16-20-24-27-32-40
3	36-40-44-60-64-72-80	5/8	12-14-16-20-24-27-28
4	24-28-32-44-56-64	11/16	12-14-18-20-24-27-32
5	24-28-32-36-48-56	3/4	12-14-18-20-24-27-28
6	24-28-36-44-48-56	13/16	12-14-18-20-24-27-28-32
7	24-28-32-36-40-48	7/8	10-12-16-18-20-24-27-32
8	24-28-30-40-48-56	15/16	10-12-16-18-20-24-27-32
9	24-28-32-36-40-48	1	10-12-16-18-20-24-27-32
10	28-36-40-44-48-56	1-1/16	8-10-12-14-16-18-20-24
11	24-28-32-36-40-48	1-1/8	8-10-14-16-18-20-24-32
12	20-30-32-36-40-48	1-3/16	8-10-12-14-16-18-20-24
14	22-28-30-32-40-48	1-1/4	8-10-14-16-18-20-24
1/16	56-64-72-80	1-5/16	8-10-12-14-16-18-20-24
3/32	48-56-64-72-80	1-3/8	8-10-14-16-18-20-24
1/8	32-36-48-56-64-72	1-7/16	8-10-12-14-16-18-20-24
5/32	32-36-40-48-56	1-1/2	8-10-14-16-18-20-24
3/16	20-28-32-36-40-48	1-9/16	8-10-12-14-16-18-20-24
7/32	20-28-32-36-40-48	1-5/8	8-10-12-14-16-18-20-24
1/4	18-22-24-27-30-32-40	1-11/16	8-10-12-14-16-18-20-24
5/16	16-20-22-27-32-36-40	1-3/4	8-10-12-14-16-18-20-24
3/8	14-18-20-27-32-36-40	1-13/16	8-10-12-14-16-18-20-24
7/16	12-16-24-27-28-32-40	1-7/8	8-10-12-14-16-18-20-24
1/2	14-16-18-24-27-28-32-40	1-15/16	8-10-12-14-16-18-20
		2	8-10-12-14-16-18-20

LEFT HAND TAPS AND DIES ALSO CAN BE FURNISHED

EASTERN TOOL and SUPPLY CO.
149 Grand St., N. Y. C.

IMMEDIATE DELIVERY ON CUTTING TOOLS

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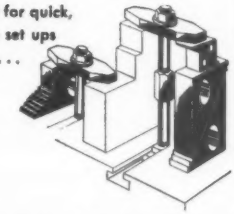
Step up Production

with TTCO

SURE GRIP STEP BLOCKS

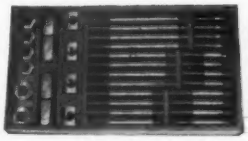
FOR MILLERS—SLOTTERS
JIG BORERS — PLANERS
RADIAL DRILLS—LATHES

. . . used for quick, accurate set ups like this . . .



and

HANDY STUD SETS



Stud sets consist of 40 pieces and provide requirements for at least 4 clamps from 3" to 15" high with T nuts for your table slot.

there's a size to fit your machine

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315-317 N. MAIN ST. • DEPT. A • ENGLEWOOD, OHIO

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Announcing

BOKUM BORING TOOLS IN *Short-Neck* **LENGTHS**

25 NEW STYLE A and 25 NEW STYLE B TOOLS

in each of
high speed steel
and carbide-tipped
for screw machines and high production boring machines.

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TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO. 14775 Wildemere Ave., Detroit 38, Mich.

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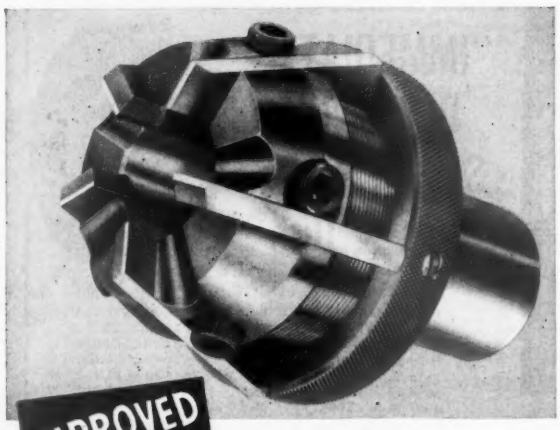

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GENESEE
Adjustable Hollow Mill

There is a size and style Genesee for every hollow milling job. Standard sizes from 0 to 2″, standard with straight or Morse Taper shanks carried in stock.

- Quick — easy adjustment
- Simple sharpening method
- High speed steel—cast-alloy —Carbide tipped blades
- Let our Engineering Department solve your Production tool problems

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566 HOLLENBECK ST. • ROCHESTER 21, N. Y.
Adjustable Hollow Mills • Facing and Counterboring Tools • Special Production Tools

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10 R. D. T. subcontract facilities
WILL CUT YOUR COSTS

FIXTURES
TOOLS • GAGES • HORIZONTAL BORING • PRODUCTION TURNING, MILLING, GRINDING, DRILLING • SPECIAL MACHINING • SPECIAL MACHINERY

• Cost of R.D.T. subcontract facilities is only a fraction of the cost of adding these same facilities to your own plant.

But, your savings don't stop here . . . Time and again, R.D.T. has called upon their years of experience and production "know-how" to reduce "necessary operations" to a minimum, thereby, effecting substantial savings in time and money.

Let us show you how you *can enjoy these savings in production costs.* Write for facilities brochure and equipment list.

ROCKFORD DIE & TOOL WORKS, INC.
1816 Seventeenth Ave.
ROCKFORD • ILLINOIS

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NEW!
LOW COST DEPENDABLE DIE STOP
Danly Universal Automatic Stop
4" sq by 6" long with 4" maximum extension.
Danly Primary Stop
⅛" thick by ⅜" wide by 2½" long.

Durably made of quality stock . . . simple and easy to attach . . . can be fitted to any die in 10 to 15 minutes. Adaptable to blanking, progressive or compound dies and can be used on strippers 5/16 inch thick and up. Works well on either right or left hand feeds—or with light or heavy material. Provides long, trouble- free performance.

Pays for itself after a few short runs

Automatic Stop individually packed with Trip Spring and Mounting Screws..... $2.50 each
Primary Stop..... $6.00 doz.
(Discount for quantity orders)

Automatic Stop

Cat. No.	A	B	C	D
9-11-6	3/16"	5"	5/8"	3"
9-21-6	1/4"	6"	3/4"	4"

Specify right or left hand

Primary Stop

Cat. No.	A	B	C
9-31-6	1/16"	3/8"	2 3/8"
9-41-6	3/32"	3/8"	2 3/8"
9-51-6	1/16"	5/8"	2 3/8"

For immediate delivery, specify size and mail orders to
DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois

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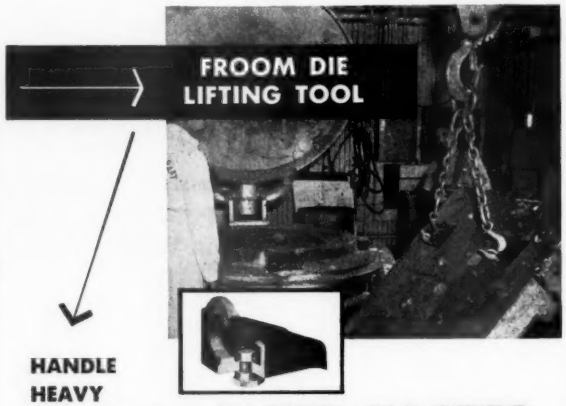


HANDLE HEAVY FORMING DIES ***SAFER-FASTER***

With A Tool Designed For The Job

Here's a tool that hoists heavy forming dies to melting pots quickly, safely, dependably—without danger to employees or possibility of damage to costly equipment. No eye-bolts to fail under stress and strain . . . no danger of "shifting" after die-lifting tool is properly positioned. "Holding power" actually *increases* as lifting force is applied!

Now in daily use in forges and foundries the country over, Froom Die Lifting Tools are simplifying a tough job safely. Write for complete details.

R. H. FROOM & COMPANY
1825 West 169th Street • Gardena, California

CIRCLE INFORM-A-GRAM KEY NO. 180D

. . . Carbides, from page 72

Wheel wear was decreased somewhat with this installation and considerably increased accuracy was obtained, but it was still too expensive to consider as a practical method for grinding turbine blades.

It was felt that the diamond wheel wear was due to the lateral vibrations of the spindle in the ball bearings. Spindle vibrations would cause a cyclical variation in depth of cut for which the abrasive action of the diamonds could not fully accommodate. The periodic overloads caused the matrix to break down with a resulting loss of diamond chips.

The vibration characteristics of the ball-bearing-mounted spindle were then eliminated by designing a high-speed, close-tolerance tungsten-carbide spindle with tungsten-carbide journal bearings. As can be seen in the accompanying sketch, the bearings were held to a plus 0.0002″ to 0.0003″ fit with the spindle. Spindle weight and grinding load end thrust, as well as vertical spindle movement, were controlled by clamping the inner race of a commercial ball bearing to the shaft and allowing the outer race to float in the housing with 0.0003″ to 0.005″ clearance.

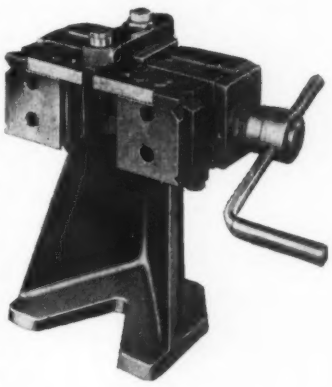
The close tolerance held in the journal bearings holds the spindle side shake well within the radial tolerance of the ball-bearing housing, thus the ball bearing has no effect on the lateral play of the shaft. It is felt that this very close control of lateral play of the spindle has been the reason for cutting down adverse vibration. The tungsten-carbide journal bearings are lubricated by introducing kerosene into annular grooves under 5 pounds pressure and uses only ½ gallon per 100 hours.

This application of tungsten carbide for spindle and journals has reduced diamond wheel wear to a very economical rate and makes it possible to obtain the required blade profile accuracy. A large number of runs have been completed on the same setup. It has been possible to finish grind full airfoil sets of experimental high-temperature turbine blades without compensation for wear. An unexpected dividend of this method has been the reduction of blade breakage to zero, thus effecting a further saving.

For Your Defense -
BUY U. S. SAVINGS BONDS

"JOHN'S" UNIVERSAL DRILL JIG

Minimizes Tooling - - - Increases Production



For cross drilling or end drilling round, hexagon, or square stock or standard or odd shaped castings from ⅛" to 8" O.D. the self-centering "JOHN'S" Drill Jig cuts tooling and production costs to minimum for 10 to 100,000 pieces. Standard removable slip fit bushings and holders available to drill center or mean off-center holes from #60 to 1-1/32" drill. Special bushing holders for multi-drill operations easily tooled. The self-centering action will hold within .004 T. I. R. or better regardless of jig wear or piece part O.D. variation. Ideal for holding rough castings. Working jaws that hold part, and bushing holders, can be doweled to provide any number of permanent drill jigs from one jig. Bases available for mounting jigs from 1" to 18" off working surface. Handles reversible; can be put on either side of jig. Can also be used with floating jaws for outside location points. Jigs available in three sizes 6", 8", 14", jaw openings 2½", 3¼", 7½". For information on hundreds of uses for jig or tooling recommendations for specific job, write:

HEUSER MANUFACTURING CO.
1638 N. Paulina St., Chicago 22, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 181A

SOLVE YOUR HOLE ACCURACY PROBLEM
with Horberg
PRECISION PIN GAGES
EXCLUSIVE CONCENTRIC ENTRY
TAPER for faster, more definite inspection of holes, for greater ease in centering.
Gage sets supplied for all common drill sizes
TOLERANCE +0.0001 −0.0000
SETS: Two gages in each size, with convenient stand.
Letter Set (A-Z) 52 Gages $50.00
Fraction Set (1/64-½, in steps of 1/64) 60 Gages 56.00
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ALL SHIPMENTS FROM STOCK
THE Horberg GAGE COMPANY
Affiliate of Horberg Grinding Industries, Inc.
Please send Horberg Pin Gage Catalog to
NAME
TITLE
(Please attach to company letterhead)

CIRCLE INFORM-A-GRAM KEY NO. 181B

. . . Press Working, from page 172

Table III Suggested Reductions in the Drawing of Cylindrical and Rectangular Shells (Ref. Reynolds Metals Company)

Material Type or Class	Thickness of Material — Inches				Maximum Depth of Draw	Minimum Corner Radius
	First Draw*	Re-Draws**	First Draw*	Re-Draws**		
	0.125 & Up	0.125 & Up	0.020-0.125	0.020-0.125		
Cylindrical Shells						
'0' (Annealed)	0.55-0.58	0.72-0.80	0.58-0.60	0.78-0.85		
H12 & H32	0.64-0.66	0.85 & Up	0.66-0.68	0.85 & Up		
H14 & H34	0.68-0.72	0.85 & Up	0.72-0.75	0.85 & Up		
H16, H36, H18 & H38	0.75-0.78	.....	0.78-0.80	.....		
61S-T4 & R301-T3	0.68-0.72	0 85 & Up	0.72-0.75	0.85 & Up		
Alclad 24S-T3, 75S-T6, Alclad 75S-T6, 61S-T6, 24S-T3 & R301-T6	0.75-0.78	.....	0.78-0.80	.....		
Rectangular Shells						
Class I '0' temper	.....				Width of Draw times 0.75	Depth divided by factor 7
Class II '0' temper	.....				Width of Draw times 0.70	Depth divided by factor 6
Class III '0' temper	.....				Width of Draw times 0.65	Depth divided by factor 5
Class IV '0' temper	.....				Width of Draw times 0.60	Depth divided by factor 4

Note on Cylindrical Shells — "F" temper material does not have controlled physical properties. Therefore, workability cannot be rated satisfactorily for drawing. Multiple drawing (while possible by reducing amount of reduction between operations) is not recommended for H16, H36, H18, H38, 61S-T6, 24S-T3, Alclad 24S-T3, R301-T6, 75S-T6 & Alclad 75S-T6.

The minimum and maximum reduction values shown in the formulae given should be used in relation to the workability classification given in Table 1, using the smaller figure for material rated Class I; and intermediate figure for Class II; etc.

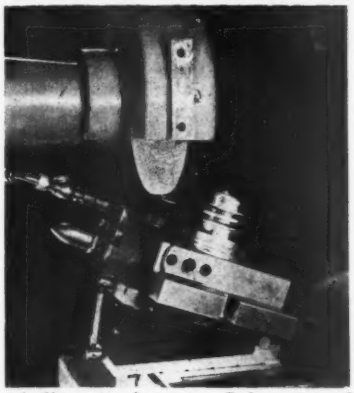
It should be remembered that the thinner the material, the more difficult it becomes to draw successfully without rupture.

*Blank size multiplied by factor given; **Previous draw size multiplied by factor given.

This comprehensive report on the pressworking of the aluminum alloys will be continued in an early issue of TOOLING and PRODUCTION.

PRECISION LAPPING AND GRINDING

The Vulcan Tool Company's motorized rotary table was designed originally for operations of toolroom accuracy involved in the manufacture of Vulcanaire high speed jig



grinding attachments. It has proved to be such a versatile tool for grinding and lapping setups that it has been made available to other users.

The table is made in two diameters, 6" and 10". It is air operated (¼ hp.) and its variable speed ranges from 40 to 100 rpm. Electric drive is optional.

As set up for grinding operations, only the grinder cross feed is used. This eliminates possible machine errors and results in fast, precision grinding to fine micro finishes on single tools on production runs. Simplified setups can be made and grinding time reduced on such workpieces as flanged studs or bushings, bearing spacers, forming rolls (angle or radius) and punches or dies (radius or angles).

For conversion to a bench lapping machine, 10" lapping plates for the 6" table and 16" lapping plates for the 10" table are available for clamping on top of rotary table. Valve plates, bearing spacers, gages, sliding

members requiring super precision or air tight seals can be lapped to extreme flatness or fine micro finishes. Resurfacing can be done without removing lapping plate, using the table's rotary power. Further details from Vulcan Tool Company, Dayton 10, Ohio. **No. D3.**

PORTER PRECISION HAS NEW SALES MGR.

D. J. Lionette has been appointed general sales manager of Porter Precision Products of Cincinnati, Ohio. Mr. Lionette was a production specialist with the U. S. Army Corps of Engineers and previously to his recent appointment was production manager of Porter Precision. He received his mechanical engineering degree from the University of Cincinnati and studied business administration at Miami (Ohio) University. Porter Precision manufactures punches and die buttons.

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Sundstrand's master and production plug gages are regularly checked with a PAR-AC electronic gage as shown; and all new plug gages are inspected upon receipt. High-speed meter shows deviations from nominal size in increments of 0.0001" or 0.000010" per scale division.

Checking distance between two boring tool bits with INDI-AC Electronic Indicator in Sundstrand's Tool and Gage Inspection Department. This company uses the INDI-AC for all types of surface plate work.

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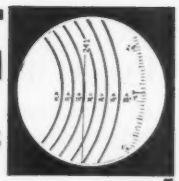

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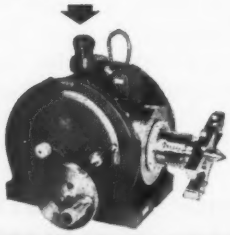

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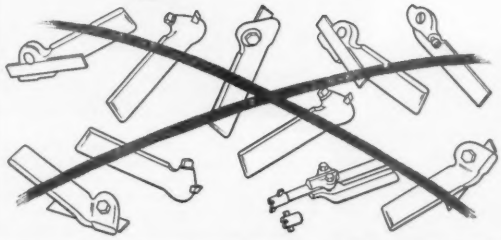

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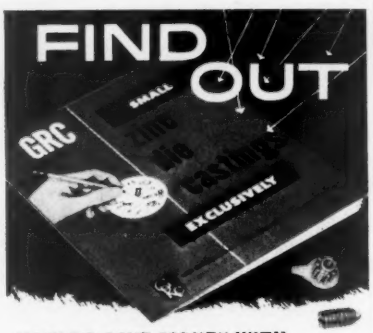

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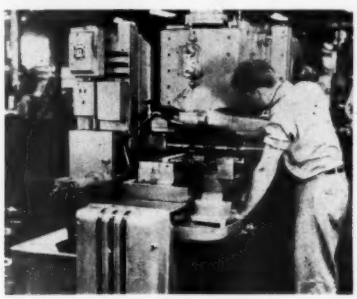
RACK SHAVING FINISHES SHAFT SPLINES

Confronted with a job that called for production of a spline with alternating thick and thin steps on the longitudinal faces of the teeth on the main drive shaft for a 6 x 6 truck, a leading automotive supplier found the answer to its problem in a set-up



Photos courtesy Michigan Tool Co.

Fig. 1. Work in position for shaving cycle on rack shaver. At left is master rack, longer than the work rack at right. Offsetting of master rack automatically results in work rack taking successive bites until job is finished in two minutes machining time.

using a rack shaver with special tooling. The purpose of the thick and thin sections in the 17-tooth spline is to help the mating gears stay in mesh despite the angular thrust of a helical gear.

Two factors had to be considered in selecting the type of equipment that would be used to do the job. First, all the shaved portions had to be squared off at the corners and go the full depth of the teeth. Second, the time required to do the job had to be held to a minimum in order to keep costs in line.

On both counts the rack shaver built by a Detroit tool Company, proved to be the answer. No other method could achieve the desired form completely, and timewise, it was impossible to come close to the two minutes machining cycle of the rack

. . . Continued on page 186

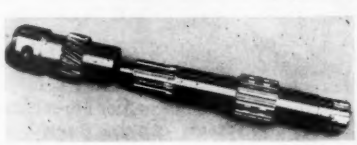


Fig. 2. Sleeve shown at left has master gear used in shaving pinion. Sleeve fits over drive shaft and is held in place by holding nut that goes on threaded end of shaft. Hole in sleeve at extreme left is used to align master gear with pinion being shaved.

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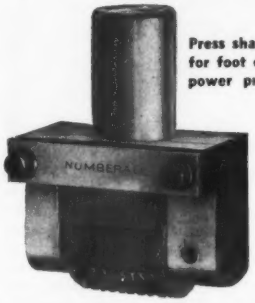

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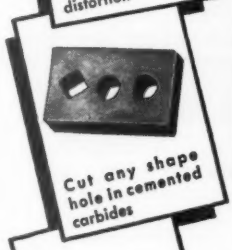

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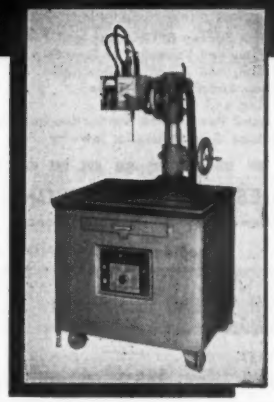

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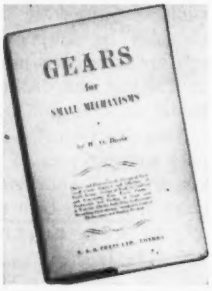

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. . . Rack Shaving, from page 184

shaver. Other shaving methods would take as long as 30 mins.

Shafts being shaved are either SAE 8620 or 4620 steel. From 8 to 12 thousandths of stock is removed on a side. Involute spline teeth are hobbed with a relief at the root, enabling stock that is being removed in shaving to break free without danger of chips loading up at bottom of tooth and damaging the blades.

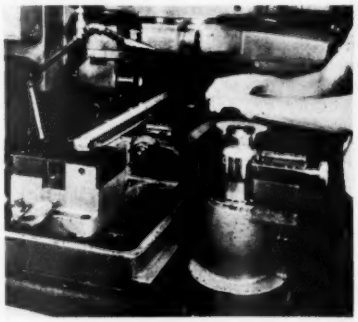

Fig. 3. Loading fixture used to align drive shaft and master gear is shown in right foreground. Pinion fits into a locating key in fixture and sleeve is lined up by pushing plunger shown at right of fixture into ground hole in sleeve. Once the two components are in line, the clamping nut is tightened and pinion is ready for shaving.

To machine the involute spline on the main drive shaft, the shaft is assembled together with a master gear as shown in Figure 2. The sleeve of the master gear slips over the threaded end of the main drive shaft. A nut placed over the threaded end holds the sleeve in place.

Since the relationship of the master gear to the spline being shaved is of considerable importance during the machining operation, a loading fixture shown in the right foreground of Figure 3 is provided. The shaft and master gear assembly are placed into the loading fixture loosely assembled and the teeth of the spline to be shaved fit into mating locating teeth in the fixture. The master gear is precisely located in relation to the spline by means of the ground hole shown in Figure 2. A locating pin slides into this hole and the two components are aligned for machining. The clamping nut is then tightened down as shown in Figure 3, and the assembly placed between centers for machining.

Several passes are needed to remove the 8 to 12 thousandths

. . . *Continued on page 188*

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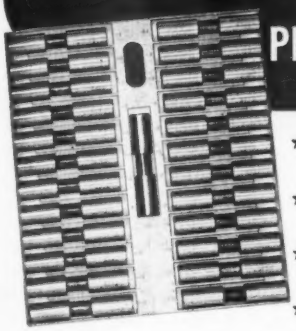

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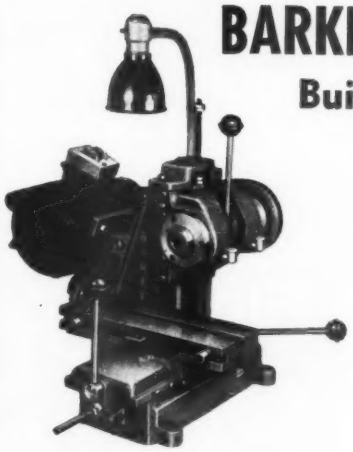

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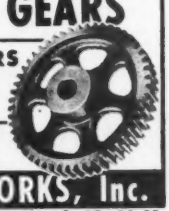

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. . . Rack Shaving, from page 186

of metal. The master rack, which is at the left in the photo, is longer than the shaving rack. As work progresses through the shaving cycle the master rack is offset relative to the shaving rack resulting in a progressive removal of metal.

Amount of metal removed in succeeding passes decreases from the first to the final pass. Control of the amount of metal removed is automatic being a function of the hydraulic circuit at the back of the machine. About 0.0015 to 0.002-inch of metal is removed in the first pass with about 0.0005-inch removed in the final pass.

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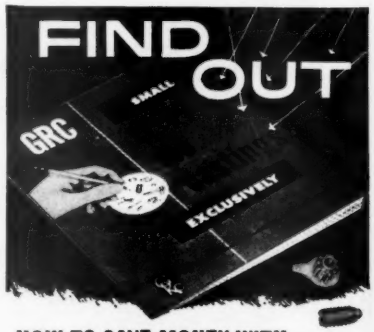

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This mobile unit permits on-the-spot demonstration of adaptability and versatility. Trained sales personnel accompany the demonstrator to operate the equipment, instruct prospective users, and answer questions.

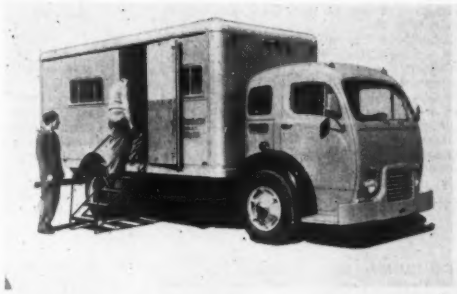
In most cases the unit may be run into plants for actual production of parts. Each mobile unit is equipped with compressor and generator to operate the Wales machines.

Figure One shows Wales self-contained mobile demonstrator which is available anywhere in the U. S.

Figure Two shows the Wales Fabricator mounted in forward section of the demonstrator with Wales hole punching units on shelves at left and Wales notching units on shelves at right of the auxiliary cabinets and tool racks.

Figure Three shows Wales Tru Edge Shear, mounted in rear of the mobile demonstrator. Note the air compressor cabinet at right and generator cabinet at left. Typical parts produced on Wales equipment are shown mounted on left side of truck.

By contacting the Wales-Strippit Corporation, 345 Payne Avenue, North Tonawanda, New York, the mobile demonstrator is available for demonstrations



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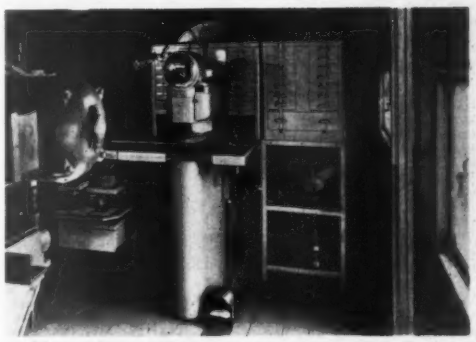

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3

SPLITTING CAP FROM CONNECTING ROD

Connecting rod forgings for automotive truck and diesel use are most commonly made as one-piece forgings. After partially machining them in this state, the cap is split from the shank of the connecting rod, then reassembled by bolts for final machining operations.

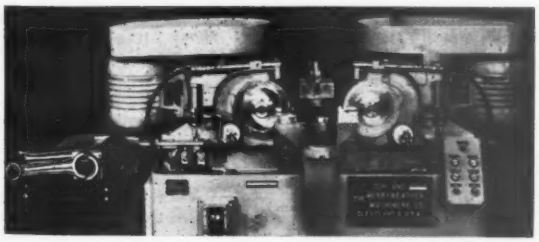

Photo courtesy The Motch & Merryweather Machinery Co.

A machine which accurately saw-cuts the cap from the connecting rod has been designed which consists of right-hand and left-hand sawing heads mounted on hardened steel ways. The saw heads are fed simultaneously from each side of the forging to part the cap from the shank.

In the cycle of operation the operator places a connecting rod in the fixture and presses a button to start the automatic cycle. This cycle consists of clamping the stock, starting the opposing saw heads to feed to the reset distance and return and open the fixture clamp.

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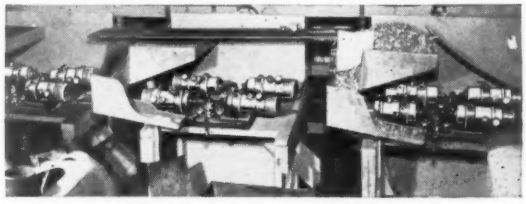

ABOUT THE PICTURES ABOVE

TOP PHOTO — PRODUCTION UP 100%
This operation involves drilling 0.1285" through holes to a maximum of 3/16" in die-cast aluminum connector plug. Previous production, 200 pieces per hour — with Dumore's it's up to 600. Note simplicity of setup due to fact Dumores need no outside air or hydraulic supply, merely plug in electric outlet. When production requires, two more Dumores are quickly, easily added to setup.

BOTTOM PHOTO — OUTPUT TRIPLED
Here are the Cannon Electric Mfg. Co.'s Dumores mounted in setups of four heads each. They're producing No. 49 to No. 18 holes to a depth of 3/16". In an hour, the Dumores complete 750 of the die-cast aluminum alloy parts compared to 250 previously.

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